U.S. Army Center for Health Promotion and Preventive Medicine

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TRAINING MUNITIONS HEALTH RISK
ASSESSMENT
NO. 39-EJ-1485-00
RESIDENTIAL EXPOSURE FROM INHALATION OF
AIR EMISSIONS FROM THE 155-MM PROPELLING
CHARGE (M3 SERIES)
DEPARTMENT OF DEFENSE IDENTIFICATION CODE: D540

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Prepared by:

Environmental Health Risk Assessment Program

Prepared for:

U.S. Army Environmental Center

Published date:

15 June 2001

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Approved for public release; distribution unlimited

Readiness Thru Health

U.S. Army Center for Health Promotion and Preventive Medicine

The lineage of the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) can be traced back over 50 years. This organization began as the U.S. Army Industrial Hygiene Laboratory, established during the industrial buildup for World War II, under the direct supervision of the Army Surgeon General. Its original location was at the Johns Hopkins School of Hygiene and Public Health. Its mission was to conduct occupational health surveys and investigations within the Department of Defense's (DOD's) industrial production base. It was staffed with three personnel and had a limited annual operating budget of three thousand dollars.

Most recently, it became internationally known as the U.S. Army Environmental Hygiene Agency (AEHA). Its mission expanded to support worldwide preventive medicine programs of the Army, DOD, and other Federal agencies as directed by the Army Medical Command or the Office of The Surgeon General, through consultations, support services, investigations, on-site visits, and training.

On 1 August 1994, AEHA was redesignated the U.S. Army Center for Health Promotion and Preventive Medicine with a provisional status and a commanding general officer. On 1 October 1995, the nonprovisional status was approved with a mission of providing preventive medicine and health promotion leadership, direction, and services for America's Army.

The organization's quest has always been one of excellence and the provision of quality service. Today, its goal is to be an established world-class center of excellence for achieving and maintaining a fit, healthy, and ready force. To achieve that end, the CHPPM holds firmly to its values which are steeped in rich military heritage:

- **★** Integrity is the foundation
 - ★ Excellence is the standard
 - ★ Customer satisfaction is the focus
 - ★ Its people are the most valued resource
 - ★ Continuous quality improvement is the pathway

This organization stands on the threshold of even greater challenges and responsibilities. It has been reorganized and reengineered to support the Army of the future. The CHPPM now has three direct support activities located in Fort Meade, Maryland; Fort McPherson, Georgia; and Fitzsimons Army Medical Center, Aurora, Colorado; to provide responsive regional health promotion and preventive medicine support across the U.S. There are also two CHPPM overseas commands in Landstuhl, Germany and Camp Zama, Japan who contribute to the success of CHPPM's increasing global mission. As CHPPM moves into the 21st Century, new programs relating to fitness, health promotion, wellness, and disease surveillance are being added. As always, CHPPM stands firm in its commitment to Army readiness. It is an organization proud of its fine history, yet equally excited about its challenging future.

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REPORT DOCUMENTATION PAGE OMB No. 0704-0188 The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS. 3. DATES COVERED (From - To) 2. REPORT TYPE 1. REPORT DATE (DD-MM-YYYY) March 1999-August 2001 Technical Report 06/15/2001 5a. CONTRACT NUMBER 4. TITLE AND SUBTITLE Training Munitions Health Risk Assessment No.39-EJ-1485-00 Residential Exposure from Inhalation of the Air Emissions from the 155mm Propelling Charge (M3 Series), Department of Defesse Identification Code: 5b. GRANT NUMBER 5c. PROGRAM ELEMENT NUMBER 5d. PROJECT NUMBER 6. AUTHOR(S) Hsieng-Ye Chang, Stafford D.F.R.Coakley 5e. TASK NUMBER 5f. WORK UNIT NUMBER 8. PERFORMING ORGANIZATION 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) REPORT NUMBER U.S. Army Center for Health Promotion and Preventive Medicine 5158 Blackhawk Road Risk Assessment # 39-EJ-1485-00 Aberdeen Proving Ground, Maryland 21010-5422 10. SPONSOR/MONITOR'S ACRONYM(S) 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) USAEC U.S. Army Environmental Center ATTN: SFIM-AEC-PC Aberdeen Proving Ground, MD 21010-5401 11. SPONSOR/MONITOR'S REPORT NUMBER(S) SFIM-AEC-PC-CR-200145 12. DISTRIBUTION/AVAILABILITY STATEMENT Distribution Unlimited 13. SUPPLEMENTARY NOTES Point of Contact: Tamera Rush 410-436-6849 14. ABSTRACT This assessment evaluated the potential for human health effects to offsite residents breathing air emissions following use of the 155 mm Propelling Charge. This document present the evaluation of the potential for adverse human health effects to the offsite residents breathing air emissions following the use of military firing ranges during training exercises. Study results showed no protential for health risks to the hypothetical resident from inhalation of air emissions from the 155 mm propelling charge. To conduct this study, air emissions from the 155mm charge were collected in a test chamber (at Aberdeen Test Center, Aberdeen, MD). This information was then used in an air dispersion model to determine ambient air concentrations at a location downwind from the site where the item was activated. Modeled air concentrations were combined with exposure information to estimate the amount of substances the hypothetical resident breathes. This intake was combined with the substance's health information, to determine if there is a potential for health risks from inhjalation of these substances. The health risk included both long-term and short term exposures to the modeled substance concentrations. Study results showed no potential for helath risks from inhalation of air emissions from the 155mm propelling charge (M3 Series) 15. SUBJECT TERMS emissions, aberdeen test center, characterization, health risk, munitions, firing point, green ammo, tungsten 18. NUMBER 19a. NAME OF RESPONSIBLE PERSON 17. LIMITATION OF 16. SECURITY CLASSIFICATION OF: **ABSTRACT** OF Tamera Rush b. ABSTRACT | c. THIS PAGE a. REPORT **PAGES** 19b. TELEPHONE NUMBER (Include area code) U U U

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410-436-6849



DEPARTMENT OF THE ARMY

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TRAINING MUNITIONS HEALTH RISK ASSESSMENT NO. 39-EJ-1485-00 RESIDENTIAL EXPOSURE FROM INHALATION OF AIR EMISSIONS FROM THE 155-MM PROPELLING CHARGE, M3 SERIES

EXECUTIVE SUMMARY

This assessment evaluated the potential for human health effects to offsite residents breathing the air emissions from the 155-mm propelling charge used during training exercises. Propelling charges are used in weapons to provide the force needed to send a projectile to its target. This assessment looked at five different combinations in which the 155-mm propelling charge is used. This involved looking at the two 155-mm propelling charges, M3 and M3A1, fired from the M199 and M284 howitzer cannons, and for two different charge zones.

To conduct this assessment, air emissions from the 155-mm propelling charge were collected in a test chamber located at the U.S. Army Aberdeen Test Center, Aberdeen Proving Ground, Maryland. The data collected from the Firing Point Emission Study provided the amount and types of substances released from the 155-mm propelling charge. This information was then used in an air dispersion model to determine ambient air concentrations at locations downwind from the 155-mm propelling charge firing location. Since the training facility in this assessment is hypothetical, the air model used assumptions that provided conservative estimates of air concentrations.

Modeled air concentrations were combined with exposure information (e.g., number of exposures per year) to estimate the amount of each substance the hypothetical resident breathes. This estimate was combined with a substance's health information, which was obtained from agencies such as the U.S. Environmental Protection Agency, to determine if there is a potential for health risks from inhalation.

The health risk assessment included both long-term (30 years) and short-term (15 minutes or 1-hour) exposures to modeled substance concentrations. Assessment results, generated using conservative methods, showed that the hypothetical offsite resident breathing air as close as 200 meters (656 feet) from the M3 and M3A1 firing locations is safe from these emissions. It should be noted that at most training facilities, training areas are at least 1,000 meters (over half a mile) away from populated areas.

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LIST OF ACRONYMS

AEGL Acute Exposure Guideline Levels

AIHA American Industrial Hygiene Association

Cr Chromium

DODIC Department of Defense Identification Code

DOE U.S. Department of Energy

EPA U.S. Environmental Protection Agency

ERPG Emergency Response Planning Guidelines

HBSL Health-Based Screening Level

HCl Hydrochloric Acid (or Hydrogen Chloride)

INPUFF Integrated Puff Model

mg Milligram
mm Millimeter

NAAQS National Ambient Air Quality Standards

NAC/AEGL National Advisory Committee for Acute Exposure Guideline Levels

NEW Net Explosive Weight

NH₃ Ammonia

OEL Occupational Exposure Limit

PM₁₀ Particulate Matter Under 10 Microns in Size

PRG Preliminary Remediation Goals

RBC Risk-Based Concentration

RfC Reference Concentration

TEEL Temporary Emergency Exposure Limits

TPCWG Total Petroleum Criteria Working Group

TSP Total Suspended Particulates

USAATC U.S. Army Aberdeen Test Center

USACHPPM U.S. Army Center for Health Promotion and Preventive Medicine

USAEC U.S. Army Environmental Center

TRAINING MUNITIONS HEALTH RISK ASSESSMENT NO. 39-EJ-1485-00 RESIDENTIAL EXPOSURE FROM INHALATION OF AIR EMISSIONS FROM THE 155-MM PROPELLING CHARGE (M3 SERIES)

1. PURPOSE

This document presents the assessment of the potential for human health effects to offsite residents who may be exposed to air emissions following the use of the 155-mm propelling charges, M3 and M3A1.

2. AUTHORITY

Memorandum, U.S. Army Environmental Center, 4 June 1999, Subject: Pyrotechnics Risk Assessment.

3. REFERENCES

See Appendix A for a list of references.

4. BACKGROUND

4.1 WHAT ARE PROPELLING CHARGES?

Propelling charges (or propellants) are a type of explosive used in weapons to send a projectile to the target. When ignited, the propelling charge causes the pressure inside the weapon to build up quickly. This pressure eventually reaches a maximum and pushes the projectile out of the barrel to the target. Some examples of projectiles include rockets, bullets, and missiles.

The amount of propelling charge used varies with the type of weapon. In smaller arms (typically any gun below a 20-mm bore size), the propelling charge is fixed. In larger weapons such as artillery ammunition, the propelling charge may be adjustable. These kinds of ammunition are also called semi-fixed ammunition. For semi-fixed ammunition, the propellant is divided into different charges. The amount of propellant used in semi-fixed ammunition depends on various factors such as distance to the target.

Propelling charges are also used to send fireworks into the sky or in flares to send the signal into the air. The major difference between these various devices is the composition of the propellant and the amount of propellant used.

4.2 WHAT IS THE 155-MM PROPELLING CHARGE?

The 155-mm propelling charge is used for firing projectiles from 155-mm howitzers (a kind of cannon). It is a semi-fixed ammunition propellant that is issued in five bags of different charges. Each bag is also called an increment and contains a premeasured amount of propellant. The bags are fastened together with cloth straps

sewn to the base of each increment and tied on the top of the fifth increment (Reference 1). The 155-mm propelling charge can be classified into two types: M3A1 and M3 (M3 series). They are also commonly called "green bags" because the charges are loaded in green cloth bags.

The M3 series contain about 5.5 pounds of propellant. Charge M3A1 also includes flash reducer pads that contain either potassium nitrate or potassium sulfate. As the name suggests, the reducer pads are used to limit breech flareback, muzzle flash, and blast overpressure in the weapon. Both the M3A1 and the M3 charges are issued with an igniter charge that is made up mostly of nitrocellulose or black powder, respectively. Both nitrocellulose and black powder are commonly used in consumer fireworks.

4.3 USES OF THE 155-MM PROPELLING CHARGE

Up to five charges can be loaded into the howitzer before a projectile can be fired. The base charge is always used and subsequent increments are loaded depending on the type of projectile or cannon used, or the distance to the target. The amount of propellant used defines a particular charge zone. For example, charge zone 3 means that the base charge and charge increments 2 and 3 are used. The range of each charge zone will vary for different weapon and projectile types.

It is very important for our troops to learn and understand the proper use of the different types of propellants and projectiles. Only through training can they learn to safely and efficiently use these devices to prepare them for combat situations.

4.4 ASSESSMENT SUMMARY

The general assessment approach consisted of two main parts: air dispersion modeling and exposure assessment. These are briefly discussed in the paragraphs below. Sections 5 through 7 present a discussion of the methodology used for this assessment.

Emissions data used in the air dispersion modeling was obtained from the Firing Point Emission Study, conducted by the U.S. Army Aberdeen Test Center (USAATC), at Aberdeen Proving Ground, Maryland (References 2, 3). This study was funded by the U.S. Army Environmental Center (USAEC) with the purpose of identifying and quantifying emissions from weapons firing. Data from this study was generated by firing munitions with weapons that are representative of those used by the U.S. Army during training operations.

The emissions data for the 155-mm propelling charge was used with an atmospheric dispersion model to estimate the average concentrations that may be experienced by an offsite resident. Since this assessment is designed to provide results that would be applicable to most Army training facilities, the training area used in this assessment was a hypothetical one. While most training areas are at least 1,000 meters away from populated areas, as a conservative distance, it was initially assumed

that a person could reside 100 meters downwind from the firing point (location where the cannon is positioned). In addition, air-modeling parameters were selected to mimic worst-case conditions.

The exposure assessment included calculations of time-averaged concentrations for both long-term (chronic) and short-term (acute) exposures. For the purpose of this assessment, air concentrations were averaged over 30 years for chronic exposures and 1-hour or 15 minutes for acute exposures. Using a screening approach, a substance's estimated time-averaged air concentration was then compared to chronic health-based screening levels (HBSLs) established by the U.S. Environmental Protection Agency (EPA) or acute toxicity values (ATVs) established by selected agencies depending on the exposure duration (i.e., 30 years versus 1-hour or 15 minutes). The comparison was made using the ratio of the HBSL or ATV to the estimated air concentration for each of the substances evaluated. If this ratio was less than one, no further evaluation was needed. This approach is conservative because the exposure assumptions used by the agencies, to establish HBSLs and ATVs, are likely to overestimate the exposures experienced by offsite residents living near firing ranges. If the chronic or acute averaged concentrations (C_{chronic} and C_{acute}) were greater than the screening levels, producing a ratio greater than one, further evaluation would be warranted to determine the potential for health effects. Note that concentrations greater than the screening levels do not indicate an onset of health effects, but rather, the potential for such.

5. DATA COLLECTION AND AIR MODELING

5.1 EMISSION FACTORS

Emission factors, used to derive the air modeling emission rates used in this assessment, were generated from the Firing Point Emission Study conducted by USAATC. This study identified and quantified air emissions from the firing of training munitions. The data included the net explosive weight (NEW), the substances sampled, and substance-specific emission factors. The 155-mm propelling charge is the first in this series of testing that fall under the Firing Point Emission Study.

Tests for the 155-mm propelling charge were conducted using conditions that would typically be encountered during short-range training or test exercises. Both the M3A1 and the M3 charges were tested using different cannons. Table 1 summarizes the test conditions in which these charges were fired. The resulting emissions data from these tests are included in the first four columns of the air dispersion modeling output data in Appendix B.

TABLE 1: TEST CONDITIONS FOR THE 155-MM PROPELLING CHARGES

| Test Munition | Weapon | Projectile | Charge Zone |
|--|----------------------|----------------------------|-------------|
| | M199 howitzer cannon | Inert M107 HE ¹ | 3 |
| Charge M3 | M199 howitzer cannon | Inert M107 HE | 5 |
| | M248 howitzer cannon | Inert M109 HE | 3 |
| Charge M3A1 | M199 howitzer cannon | Inert M109 HE | 3 |
| | M248 howitzer cannon | Inert M109 HE | 3 |
| 'HE = high explosive Source: Reference 2 | | <u> </u> | |

5.2 BACKGROUND AND DESCRIPTION

Air dispersion models are available to mathematically simulate plume behavior and to estimate downwind concentrations of substances emitted from various sources. However, specific models are not available to determine the dispersion of emissions from munitions used during training. Estimating the magnitude and location of these concentrations depends on many factors including the amount and type of emissions, the behavior of the source, and meteorological conditions. Since a specific model is not available for modeling the use of munitions during training, the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) evaluated numerous air models to determine which would be suitable for use with munitions used during training. The USACHPPM recommended using the Integrated PUFF (INPUFF) model to estimate the dispersion of emissions from various sources (Reference 4).

The INPUFF Model (Reference 5) was developed to simulate dispersion from instantaneous or semi-continuous point sources. This Gaussian-integrated puff model is capable of addressing a cloud type release over short periods of time, and computations can be performed for a single point source for multiple receptors. The algorithms used to calculate concentrations assume a vertically uniform wind direction (with no chemical reaction) to compute the contribution of each cloud at a receptor for each time step/interval.

5.3 MODEL ASSUMPTIONS

Some assumptions were made to best represent the firing of 155-mm rounds with the M3 and M3A1 propellant charges. These assumptions were as follows:

Typically, with conventional point sources (such as incinerators), the cloud rise and formation are determined by characterizing flue gas exit velocity, temperature, and stack diameter. However, the M3 and M3A1 propellants are used in conjunction with cannon systems of various lengths and diameters. For unconventional sources with no real physical stack dimensions, such as the 155-mm howitzer cannons, the stack height and

diameter were assumed to equal to the height of the barrel and the bore diameter. No exit velocity was used with these sources because the emission rates generated from the test data were obtained from sampling a stabilized cloud with no exit velocity. Table 2 includes the source parameters used to model the M3 and M3A1 propellant charges.

TABLE 2: SOURCE PARAMETERS

| Parameter | Model Input |
|--|--|
| Source/Stack Diameter | 0.155 meters |
| Source/Stack Height | 1.52 meters |
| Source Exit Temperature | Varied per propellant combination tested |
| Exit Velocity | 0 meters/second |
| Initial horizontal dispersion coefficient (σ_y) | Varied per propellant combination |
| Initial vertical dispersion coefficient (σ_z) | Varied per propellant combination |

The two cannons used for this study were the M199 and M284 howitzers. Initial cloud dimensions are preferred to model the air emissions from these types of releases. Since this information was not measured during the studies conducted at the USAATC, visual estimates of each cloud's two-dimensional length and height were made using video footage for each test condition. The video footage showed three distinct exhaust clouds that were produced from the firings. Both cannons are equipped with muzzle brakes that divert exhaust gases and pressures 90 degrees to the left and right and to the center (front) of the muzzle. All three clouds were combined to form a single worst-case cloud with an effective volume (V_e) and effective radius (r_e). The initial horizontal and vertical dispersion values (σ_y and σ_z) of the single worst-case cloud were determined from the height and length of the single worst-case cloud. Temperature and pressure data were also recorded during testing. An average cloud temperature was calculated based on the temperatures recorded for each cloud produced during a firing scenario.

The volume of each cloud was calculated using Equation 1 and a sample calculation is provided in Example 1.

 $V = \pi r^2 h$

Equation 1

Where:

 $V = \text{Volume (ft}^3)$ r = radius; one half the height of the cloud (ft)h = length of the cloud (ft)

Example 1 Sample Calculation Using Equation 1:

$$V_{left} = \pi (1.5)^2 (15) = 106.02 \text{ ft}^3$$

Calculation provided for clouds produced from the M3 propellant, Zone 3, using the M199 cannon. Based on visual estimates, the three clouds produced by this test condition were nearly equal in height and length.

The cumulative/effective volume of each cloud was calculated using Equation 2. Example 2 provides an sample calculation using Equation 2.

Equation 2

Where:

 $V_{\rm e}$ = the effective volume of a single worst- case cloud (ft³)

Note: The volumes of the left, right and center clouds were based on two-dimensional measurements of height and length. The clouds were assumed to grow equally in all directions.

Example 2 Sample Calculation Using Equation 2:

$$V_e = 106.02 + 106.02 + 106.02 = 318.06 \text{ ft}^3$$

Calculation provided for clouds produced from the M3 propellant, Zone 3, using the M199 cannon. Based on visual estimates, the three clouds produced by this test condition were nearly equal in height and length.

The effective radius (r_e) of the worst- case cloud was calculated using Equation 3. A sample calculation is provided in Example 3 below.

$$r_e = \sqrt{\frac{v_e}{\pi h}}$$
 Equation 3

Where:

 V_e = the effective volume of a single worst- case cloud (ft³) r_e = the effective radius of a single worst- case cloud (ft)

Note: Assuming a cylindrical cloud with the prevailing wind direction being perpendicular to the cannon muzzle when fired, r_e is equal to the initial vertical dispersion, σ_z and the initial horizontal dispersion, σ_y is equal to one half the length of the worst- case cloud.

Example 3 Sample Calculation Using Equation 3:

$$r_{\rm e} = \sqrt{\frac{318.06}{\pi(15)}} = 2.60 \text{ ft}$$

Calculation provided for clouds produced from the M3 propellant, Zone 3, using the M199 cannon.

- ➤ For this assessment, a hypothetical offsite resident was assumed to be located first at 100 meters, then at 200 meters directly downwind from the source. The meander of the cloud is a major factor when estimating concentrations at given locations downwind from the source. Assuming that the resident is directly downwind from the source is the same as assuming that there is no cloud meander and that the center of the cloud migrates directly over the hypothetical offsite resident. This assumption provides the most conservative modeled concentrations.
- Since this assessment does not look at a specific training site, generic, worst-case meteorological data were used. To determine the worst-case meteorological conditions that would result in the highest air emission concentrations, the modeling was performed using the EPA Risk Management Program Guidance (Reference 6). This guidance includes tables for estimating the footprint of chemical releases, and is intended to inform emergency responders of potential accidental releases. The EPA has

defined most default conditions for meteorological modeling parameters. Table 3 lists the meteorological parameters that were used in the air model.

TABLE 3: WORST-CASE METEOROLOGICAL PARAMETERS

| Parameter | Model Input |
|-----------------------|------------------------------------|
| Wind Speed | 1 meter/second |
| Atmospheric Stability | Category F |
| Wind Direction | 270° |
| Ambient Temperature | 293 degrees Kelvin (°K) (or 68 °F) |

5.4 GENERAL METHODOLOGY

The model was run for a total calculation time of 200 seconds for the 100-meter location and 400 seconds for the 200-meter location. This was done to simulate a single round being fired and to ensure that the total mass of the cloud had passed the receptor locations. Concentrations were calculated every 2 or 4 seconds, depending on the location being modeled. Table 4 contains the air model input parameters used in this assessment.

TABLE 4: AIR MODEL INPUT PARAMETERS

| Parameter | Mode | Input |
|--|-------------|--------------|
| - 4.4170201 | 100 meters | 200 meters |
| Number of meteorological periods (NTIME) | | 1 |
| Duration of each meteorological period (ITIME) | 200 seconds | 400 seconds |
| Number of updates to the source (NSRCDS) | | 00 |
| Duration/time step between each source update (ISUPDT) | 2 seconds | /4 seconds |
| Total time modeled/Simulation Period (NTIME) (ITIME)= (NSRCDS) (ISUPDT) | 200 seconds | /400 seconds |

5.5 USE OF MODEL OUTPUT

The concentrations provided by the INPUFF model were based on a unit emission rate of 1 gram/second from an emission source, and did not represent any substance-specific concentrations from the use of any weapons system. This unit emission rate is typically used for ease of modeling purposes. The relationship between the emission rate and predicted concentration is linear. Therefore, the ratio of the predicted concentration to the unit emission rate was multiplied by each substance-specific emission rate to provide substance-specific concentrations.

5.6 DETERMINATION OF SUBSTANCE-SPECIFIC EMISSION RATES

The actual emission rate for one item (ER₁) for each substance was calculated using Equation 4. Example 4 contains a sample calculation using this equation.

$$ER_1 = \frac{EF \cdot CV}{t}$$
 Equation 4

Where:

 ER_1 = emission rate for one item (g/sec)

EF = average adjusted emission factor (lb/item)

CV = conversion factor (453.59 g/lb)

t = release duration obtained from the INPUFF model (sec)

Example 4 Sample Calculation Using Equation 4:

$$ER_1 = \frac{(4.120 \text{ E} - 02) (453.59)}{(4)} \times 1 \text{ item}$$

= 4.672 E+00 g/sec

Calculation provided for ammonia (NH₃) from data for the M3, Zone 3, M199 cannon, 200 meters downwind from the firing point. Appendix B contains the average adjusted emission factor of NH₃ in lb/item.

Substance-specific ambient concentrations for one item (CONC) were calculated using Equation 5. A sample calculation is provided in Example 5.

$$CONC = ER_1 \cdot \frac{UC}{ER_{unit}}$$
 Equation 5

Where:

CONC = substance concentration based on one item (g/m³)

 ER_1 = emission rate for one item (g/sec)

 ER_{unit} = unit emission rate as used in the model (g/sec)

UC = concentration based on the unit emission rate (g/m³)

Example 5 Sample Calculation Using Equation 5:

$$CONC = (4.672E + 00) \frac{(6.914E - 05)}{(1)}$$

$$= 3.230E-04 g/m^3$$

Calculation provided for NH₃, for the propelling charge M3, Zone 3, M199 cannon, 200 meters downwind from the firing point.

6. RISK ASSESSMENT

6.1 EXPOSURE ASSUMPTIONS

Exposure assumptions were selected using a typical use scenario for the 155-mm propelling charge. This use scenario was provided by the USAEC and is based on consultation with their senior training advisor (References 7). The frequency of use of the propelling charge was required to determine how much substance an offsite resident would be exposed to in the time period of interest (i.e., acute or chronic exposure). Table 5 summarizes the general use scenario for the 155-mm propelling charge.

TABLE 5: FREQUENCY OF USE FOR THE 155-MM PROPELLING CHARGE

| Parameter | General Training Scenario |
|---|--|
| Number of items used per training scenario | 98 items over 6 weeks |
| Number of training scenarios per year at a specific training location | . 2 |
| Time between events | Week 1 – 30 per 24 hour period Week 3 – 34 per 24 hour period Week 5 – 34 per 24 hour period |
| Maximum number of items that could potentially be used in one hour | 26 |

6.2 TIME-AVERAGING

For the chronic assessment, time-averaged concentrations were calculated by assuming that the hypothetical resident would be exposed for 30 years. This is consistent with the exposure duration used by the EPA, which assumes that the resident spends 30 years at the same residence. By using the same exposure duration, the estimated time-averaged concentrations could be compared with their respective HBSLs, which are derived using standard EPA default assumptions.

As shown in Table 5, training in which the 155-mm propelling charge is used occurs over two 6-week periods (Reference 6). In addition, based on the information

provided, actual training takes place three times during this 6-week period. Therefore, for this assessment, the total number of days that a nearby resident was exposed to the air emissions from the 155-mm propelling charge is 6 days a year (3 days per training scenario x 2 trainings scenarios per year).

Another parameter that is needed for the exposure assessment is the duration of each exposure. This parameter depends on various factors such as wind velocity and therefore, cannot be accurately predicted. However, to be consistent with the assumptions used in the air model, the simulation period (see Table 4) for each round was used in the exposure assessment. This simulation period is the same for the five different test conditions.

The average daily concentrations were calculated using Equation 6. A sample calculation using NH₃ is shown in Example 6.

$$C_d = \frac{CONC \cdot 10^6 \cdot ET_{round} \cdot EF_{day}}{1440}$$
 Equation 6

Where:

 C_d = the average daily concentration (μ g/m³) CONC = average modeled concentration (g/m³)

10⁶ = units conversion (μ g/g)

 ET_{round} = exposure time (minutes/round)

 EF_{day} = number of events per day (rounds/day)

1440 = unit conversion (minutes/day)

Example 6 Sample Calculation Using Equation 6:

$$C_{d(NH_3)} = \frac{(3.231E - 04)(10^6)(6.67)(34)}{1440}$$
$$= 5.088E + 01 \,\mu\text{g/m}^3$$

Example is provided for charge M3 (zone 3), using the M199 cannon. Averaged modeled concentration of NH₃ is for a distance of 200 meters downwind from the firing point. Table 6 summarizes the exposure parameters.

Chronic averaged concentrations were calculated using Equation 7. The resulting concentration (C_d) from Equation 6 was used in Equation 7 to determine the averaged chronic concentrations. Example 7 shows how this calculation was performed.

$$C_{chronic} = \frac{C_d \cdot EF_{years} \cdot ED}{AT}$$
 Equation 7

Where:

 $C_{chronic}$ = average chronic concentration (μ g/m³) C_d = average daily concentration (μ g/m³)

 EF_{years} = number of days per year (days/year)

ED = exposure duration (year)
AT = averaging time (days)

(for carcinogenic endpoint, AT = 70 years x 365 days per year; noncarcinogenic endpoint, AT = ED x 365 days per year)

Example 7 Sample Calculation Using Equation 7:

$$C_{chronic(NH_3)} = \frac{(5.088 \,\mathrm{E} + 01)(6)(30)}{(30)(365)}$$
$$= 8.36 \,\mathrm{E} - 01 \,\mu\mathrm{g/m}^3$$

Averaged daily concentration was calculated as shown in Example 6. Table 6 summarizes the exposure parameters.

This assessment assumed that the same person would be exposed 6 days every year for 30 years. As shown from Table 5, the use of the 98 items is spread out unevenly over a 6-week period. Therefore, to provide conservative estimates for this assessment, it was assumed that 34 rounds (as opposed to 30 rounds) were activated during each day of training. This results in a total of 104 items used over a 6-week period as opposed to the 98 items listed in Table 5. Table 6 summarizes the exposure parameters used in Equations 6 and 7.

TABLE 6: EXPOSURE PARAMETERS USED TO DETERMINE TIME-AVERAGED CHRONIC AIR CONCENTRATIONS

| Exposure Parameter | Value Used |
|--|--------------------|
| Exposure Time (ET _{round}) | |
| At 100 meters | 3.60 minutes/round |
| At 200 meters | 6.67 minutes/round |
| Exposure Frequency (EF _{day}) | 34 rounds/day |
| Exposure Frequency (EF _{year}) | 6 days/year |
| Exposure duration (ED), years | 30 years |

Unlike the chronic assessment, only limited guidance for evaluating acute exposures is currently available. For the purpose of this assessment, acute is defined as a 1-hour or a 15-minute exposure. The 1-hour or 15-minute acute exposure averaging times allow for comparison with guidelines developed specifically for emergency planning purposes (see discussion on acute toxicity below).

The USAEC senior training advisor conservatively estimated that as many as 26 rounds could be fired in 1 hour. Based on the lack of information to better quantify acute exposures, this assessment assumed that 26 rounds are used in one hour. Average acute concentrations were computed using Equation 8 followed by a sample calculation in Example 8. If a substance has an acute toxicity that is based on a 15-minute exposure, Equation 8 was adjusted by a factor of 1/0.25 (where 0.25 is 15 minutes expressed in hours).

$$C_{acute} = \frac{CONC \cdot 10^6 \cdot ET_{round} \cdot EF_{hour}}{60}$$
 Equation 8

Where:

C_{acute} = average acute concentration (µg/m³) CONC = average modeled concentration (g/m³) 10⁶ = unit conversion (µg/g)

ET_{round} = exposure time (minutes/round) EF_{hour} = exposure frequency (rounds/hour) 60 = units conversion, (minutes/hour)

Example 8 Sample Calculation Using Equation 8:

$$C_{acute(NH_3)} = \frac{(3.231E - 04)(10^6)(6.67)(26)}{60}$$
$$= 9.33E + 02 \ \mu g/m^3$$

Example is provided for charge M3 (zone 3), using the M199 cannon. Averaged modeled concentration of NH_3 is for a distance of 200 meters downwind from the point source. Since the acute toxicity value for NH_3 is based on a 1-hour exposure, no further adjustment in the acute concentration was necessary.

6.3 TOXICITY ASSESSMENT

The potential for health risks was determined by comparing time-averaged air concentrations to health-based screening levels, which are developed from a substance's known toxicity. These toxicity values typically include different levels of safety factors depending on the level of confidence of the critical study. Appendix C contains a table of screening toxicity values for the chronic and the acute assessments.

6.3.1 CHRONIC ASSESSMENT

The chronic assessment was conducted using a screening approach. Using this method, a substance's estimated time-averaged concentration was compared to its HBSL by using the ratio of the HBSL to the estimated concentration. If this ratio was less than one, no further analysis was necessary. This approach is conservative because the exposure assumptions used by the EPA, to develop HBSLs, assume that the resident is exposed for 350 days per year (this assumes 2 weeks of vacation per year). In contrast, exposure to air emissions from actual training with the 155-mm propelling charge is intermittent and not likely to occur on a daily basis year round.

A hierarchy of sources was developed for selection of the HBSLs to quantitatively evaluate as many of the identified substances as possible. The hierarchy of sources used was as follows:

- Clean Air Act, EPA National Ambient Air Quality Standards (NAAQS) (Reference 11)
- > EPA Region 9 Preliminary Remediation Goals (PRGs) (Reference 9)
- ➤ EPA Region 3 Risk-Based Concentrations (RBCs) (Reference 8)

Some substances have neither PRGs nor RBCs because they have their own set of regulatory standards. Under the Clean Air Act, the EPA is required to establish NAAQS for several substances considered harmful to public health and the

environment. Currently, NAAQS are available for seven substances. The NAAQS for the longer averaging time were used for the chronic assessment. Depending on the substance, this can range from an 8-hour average to an annual average. In addition, since the majority of the measured total suspended particulates (TSP) were PM_{10} (particulate matter under 10 microns in size) (Reference 3), the NAAQS for PM_{10} was used to evaluate the potential for health effects from exposure to TSP.

Next on the hierarchy, after the NAAQS, are the EPA Region 9 PRGs and the EPA Region 3 RBCs. Since the methodology used by EPA Region 9 to develop the PRGs generally results in lower values than the EPA Region 3 RBCs, the PRGS were first on the hierarchy of sources. RBCs were used when a PRG was not available. The only exception was for chromium (VI) [Cr (VI)] where Region 9 used a carcinogenic toxicity value that was seven times greater than EPA's recommended value (Reference 10) to develop its screening level for inhalation exposure. Since the EPA does not advocate the application of this multiplication factor, the RBC for Cr (VI) was used instead of the PRG. To ensure that the most recent information was used, the Internet sites of both EPA Regions were checked. The HBSLs used for this assessment are presented in Appendix C.

Although the general approach used by both EPA Region 3 and Region 9 is the same, the exposure assumptions differ enough so that final recommended values can vary to a certain degree. In both methods, a substance's screening concentration was selected using the toxicity endpoint that derives a lower concentration. For example, if a substance has a known systemic toxicity and is a carcinogen, the screening concentration was calculated using both toxicity values. To maintain a conservative approach, EPA then selected the lower screening concentration as the recommended PRG or RBC.

Example 9 shows a sample calculation of how a substance's estimated chronic concentration is compared to its HBSL.

Example 9

Sample Calculation Comparing a Substance's Estimated Chronic Concentration to Its Health-Based Screening Level:

$$\frac{C_{chronic(NH_3)}}{HBSL} = \frac{8.36E - 01}{1.04E + 02}$$
$$= 8.02E-03 \text{ (or } 0.008) < 1$$

Note that HBSL for NH_3 is based on Region 9's PRG. In this case, the resulting ratio is three orders of magnitude less than one.

Many petroleum hydrocarbons were detected but do not have specific screening levels. Therefore, the approach recommended by the Total Petroleum Criteria Working Group (Reference 12) was adopted to evaluate petroleum hydrocarbon mixtures. Based on the working group's assessment of various hydrocarbons, they recommended that mixtures be separated according to a substance's number of carbons and its chemical class (i.e., aliphatic or aromatic¹). Generally, as a substance's carbon number increases, its molecular weight increases and it is, therefore, not a substance of concern via inhalation. The working group has also concluded that aromatic hydrocarbons tend to be more toxic than aliphatic hydrocarbons (Reference 12). Table 7 tabulates the inhalation toxicity values used to evaluate exposure to petroleum mixtures. To be consistent with the methodology used in this assessment, the reference concentrations (RfCs) were converted to PRGs using Region 9 exposure assumptions. The resulting PRGs were used as the HBSLs for the petroleum hydrocarbons in this assessment. These values are presented in Appendix D.

TABLE 7: SUMMARY OF RfCs USED FOR PETROLEUM HYDROCARBONS1

| Carbon Range | Aromatic Inhalation RfC (mg/m³) | Aliphatic Inhalation RfC (mg/m³) |
|--|---------------------------------|-------------------------------------|
| $C_5 - C_6$ $C_{>6} - C_8$ | | 18.4 |
| $C_{>7} - C_8$ | 0.4 | |
| $C_{>8} - C_{10} \ C_{>10} - C_{12} \ C_{>12} - C_{16}$ | 0.2 | 1.0 |
| C _{>16} - C ₂₁ C _{>21} - C ₃₅ | NA NA | NA |

NA = not applicable for high molecular weight TPHs (C_{>16}) because compounds in this carbon range are not volatile and therefore, inhalation is not a pathway of concern.

¹ Reference 12

6.3.2 ACUTE ASSESSMENT

An established method for assessing acute health effects is not currently available. In 1995 the EPA recognized the need for acute exposure guidelines for emergency response purposes and created the National Advisory Committee for Acute Exposure Guideline Levels (AEGLs) for Hazardous Substances. Currently, AEGLs are only available for only a few substances.

To overcome the absence of acute toxicity data, several state regulatory agencies have suggested that guidelines developed for emergency purposes be used in the interim. Although there have been suggestions to use occupational exposure limits

¹ Aliphatic hydrocarbons are hydrocarbons in which the carbon atoms are joined by single covalent bonds consisting of two shared electrons (e.g., butane). Aromatic hydrocarbons have ring structures (e.g., benzene). Source: Reference 13

(OELs) by applying additional safety factors (References 14, 15), OELs were not used in this assessment because they introduce even more uncertainty than the use of emergency guidelines. The OELs are designed to protect the workplace environment and assume 8 hours a day, 5 days a week exposures. By definition, these exposures are more chronic than acute.

In comparison, emergency planning guidelines are more appropriate because they are typically developed for exposures of 1-hour or less. In addition, safety factors are included as part of the guideline development, so that the values are protective of the general population.

Emergency Response Planning Guidelines (ERPG) published by the American Industrial Hygiene Association (AIHA) (Reference 16) and the Temporary Emergency Exposure Limits (TEELs) developed by the Department of Energy (DOE) (Reference 17) were also used for this assessment, specifically the ERPG-1s and the TEEL-1s. Since TEEL-1s are intended for exposures up to 15-minutes, air concentrations compared to TEELs were averaged over a 15-minute period. Air concentrations compared to the ERPGs and AEGLs were averaged over 1-hour, as these values are intended for 1-hour exposures.

For this study, the hierarchy of sources for ATV selection was as follows with each ATV defined below:

- ➤ EPA AEGL-1. "AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic, nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure."
- ➤ AIHA ERPG-1. "The maximum concentration in air below which it is believed nearly all individuals could be exposed for up to one hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor."
- ➤ DOE TEEL-1. "The maximum concentration in air below which it is believed nearly all individuals could be exposed without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor."

AEGLs were used first when available since they are developed specifically for the purpose of acute exposure assessments. The ERPGs were selected next, prior to a substance's TEEL, because they are vigorously reviewed before they are published whereas the TEELs are not.

Example 10 shows a sample calculation of how a substance's estimated acute concentration was compared to its acute toxicity value.

Example 10

Sample Calculation Comparing a Substance's Estimated Acute Concentration to Its Acute Toxicity Value:

$$\frac{C_{acute(NH_3)}}{ATV} = \frac{9.33E + 02}{1.75E + 04}$$
$$= 5.33E-02 \text{ (or 0.05)} < 1$$

Note that ATV in this example is based on NH_3 's ERPG-1. In this case, the resulting ratio is less than one, indicating that further analysis is not necessary.

7. RISK CHARACTERIZATION

As previously described, the exposure assessment included calculations of time-averaged concentrations for both long-term (chronic) and short-term (acute) exposures. Using a screening approach, a substance's estimated time-averaged air concentration was then compared to chronic HBSLs or ATVs. The comparison was made using the ratio of the HBSL or ATV to the estimated concentration. This approach is conservative because the exposure assumptions used by the EPA, to establish HBSLs and ATVs, are likely to overestimate the exposures experienced by offsite residents living near training areas.

If this ratio was less than one, no further evaluation was needed. If the chronic or acute averaged concentrations (C_{chronic} and C_{acute}) were greater than the screening levels, resulting in a ratio greater than one, further evaluation would be warranted to determine the potential for health effects. Note that concentrations greater than the screening levels do not indicate an onset of health effects, but rather, the potential for such.

The chronic and acute assessments were conducted as outlined in Section 6.3. Appendix D presents results for the five different test conditions. Results are provided for air concentrations estimated for both 100 meters and 200 meters downwind from the firing location.

7.1 CHRONIC HEALTH RISK

The chronic assessment, at the 100-meters downwind hypothetical resident location, indicated that two of the five test conditions had estimated chromium concentrations that were greater than the HBSL. The ratios of all other substances for these two conditions, except for carbon monoxide, were all well below one. Since the 100 meters location was used as an initial evaluation, the air model was remodeled to a distance 200 meters downwind from the firing point location. The results showed that the estimated air concentrations of chromium for the two test conditions indicated above

decreased to levels below chromium's HBSL. In addition, the estimated air concentrations of all other substances were also significantly reduced. All ratios for the other three test conditions were below one. Therefore, no further analysis was conducted.

Both test conditions, resulting in estimated chromium concentrations greater than the HBSL, involved the use of charge M3, fired from the M199 cannon, and for both zones 3 and 5. The ratios of the estimated chromium concentrations to the HBSL were 2.5 and 2.1, respectively. The HBSL for chromium is based on a carcinogenic endpoint. It should be noted, again, that exceedance of the HBSL does not indicate onset of health effects. In addition, for this assessment, the total chromium concentration was assumed to be present as Cr (VI), the most toxic form via inhalation. It is likely that the estimated Cr (VI) concentration would be much lower since it is highly unstable in the environment.

The ratios of estimated carbon monoxide concentrations were below one for each of the five test conditions. However, the ratios resulting from use of the charge M3, when fired from the M199 cannon for zones 3 and 5, were not significantly less than one (0.586 and 0.963, respectively). Since carbon monoxide is not carcinogenic, the health effects of carbon monoxide and chromium cannot be added together.

7.2 ACUTE HEALTH RISK

All test conditions, with the exception of one, had ratios at or below one for the acute assessment. The test condition for which an exceedance occurred was for copper from the charge M3, zone 5, fired from the M199 cannon. All ratios for other substances were below one. The concentration of copper decreased to a safe level when the distance of the hypothetical downwind resident increased from 100 to 200 meters. Therefore, no further evaluation was conducted. Modeled air concentrations for other substances were further decreased when the downwind distance was increased from 100 to 200 meters.

Results indicated that at a distance 100 meters from the firing point location the ratio for copper was 1.26. Acute health effects from exposure to copper can result in eye and respiratory irritation. At the increased distance of 200 meters, the ratio of the estimated copper concentration to its ATV was reduced to 0.52.

7.3 FACT SHEET

Appendix E includes a copy of the fact sheet submitted to the USAEC. The fact sheet used the results from this assessment to summarize health concerns related to inhalation of the air emissions from the 155-mm propelling charge.

8. UNCERTAINTY DISCUSSION

The limitations inherent in modeling and the added conservatism of the evaluation contribute to the uncertainty of the assessment results. In addition, the risk assessment

methodology typically may include safety factors that are embedded in the toxicity data to ensure adequate protection of the general population, particularly, susceptible individuals such as children, the sick, and the elderly. Table 8 identifies various areas of uncertainty related to this assessment.

TABLE 8: TYPES OF UNCERTAINTY

| Issue | Uncertainty | Direction of Effect |
|--|--|------------------------|
| | Emissions Modeling | 1 |
| Modeled versus real-time sampling | The air concentrations in this assessment were modeled. Actual air concentrations taken from the field may be higher or lower. | Varies |
| Hypothetical resident assumed to be located directly downwind | Unless the area around the training facility is populated, the chances that a person living directly downwind is low. | Overestimates |
| Frequency of use for 155-mm propelling charge | Actual frequency of use of 155-mm propelling charge during training exercises may be different from those stated in this report. | Varies |
| Using worst-case meteorological conditions | To ensure that this assessment may be applicable to all training areas, worst-case meteorological conditions were used in the air model runs. | Overestimates |
| | Exposure Assessment | L |
| Estimating time- averaged concentrations | Actual exposure from the 155-mm propelling charge is intermittent. If one were to plot a person's exposure profile, the plot would consist of a series of spikes. Since current risk assessment methodology does not allow the evaluation of potential health risks as a function of time, a single concentration, averaged over the exposure duration was used. In this assessment, the exposure durations used were 30 years and 1-hour or 15 minutes. | Varies |
| Chromium speciation | All chromium was assumed to be Cr (VI), which is more toxic than Cr (III). | Overestimates |
| Comparing estimated concentrations to established screening levels | The Region 3 and Region 9 health- based screening levels were developed using different exposure assumptions from those in this assessment. In this case, these assumptions resulted in | Overestimates |

| Issue | Uncertainty | Direction of Effect |
|---|---|------------------------|
| | more conservative screening levels. | |
| Screening assessment versus calculating an average daily intake | Calculating an average daily intake allows the use of scenario-specific assumptions. | Varies |
| Exposure to other munitions | Other munitions are typically used during the same training event. These items may contain substances that are similar or different from those detected in the 155-mm propelling charge. | Underestimates |
| | Toxicity Assessment | |
| Lack of toxicity data | Some substances were not quantitatively evaluated because they have no known toxicity data. | Underestimates |
| Modifying and uncertainty factors for toxicity data | Modifying factors and uncertainty factors of varying degree are typically applied to toxicological values. These factors are used to account for different conditions such as extrapolating from animal studies for human health evaluation. | Overestimates |
| Substances that produce the same toxic endpoint or affect the same target organ | Although conservative assumptions are used in a screening methodology, this approach does not consider exposure to multiple substances. However, unless a substance's concentration compared to its screening level approaches one, a screening assessment is useful as a first-cut evaluation. | Underestimates |

9. CONCLUSION

Using conservative assumptions, the assessment indicated that offsite residents who live as close as 200 meters directly downwind from the firing location are safe from inhalation of the air emissions from the 155-mm propelling charge. It is believed that the assumptions contained in this assessment are conservative enough to be protective of all the population including the sick, elderly, and children.

10. RECOMMENDATIONS

At installations where offsite residents are located less than 200 meters from the 155-mm propelling charge firing location, a more site-specific evaluation is recommended. However, it should be noted that at most training installations, training areas are over 1,000 meters (over half a mile) away from populated areas.

The results from this assessment are intended for a hypothetical training facility and actual results may vary depending on site-specific conditions. This assessment used conservative assumptions (e.g., worst-case meteorological conditions) and it is believed that most site-specific analyses would result in even lower concentrations. Therefore, the results from this assessment should be applicable to most training facilities unless site-specific conditions vary significantly.

11. POINT OF CONTACT

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APPENDIX A
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APPENDIX B AIR DISPERSION MODELING OUTPUT DATA

AIR MODELING OUTPUT DATA FOR CHARGE M3, FIRED FROM THE M199 CANNON, ZONE 3, 100 METERS DOWNWIND

Table B-1: Air Modeling Output Data for Gases, Metals, and Particulates - 100 meter location

| | 155mm | propelling charge | 155mm propelling charge M3 (zone 3) M199 cannon | Gannon | (I) abrupt of ON | | 4 |
|----------------------|-----------------|--|---|-----------------------|--------------------------|-------------------|------------------------|
| | | naoa | DODIC: D540 | | release duration (t): | - 2 | seconds |
| | e Z | Net Explosive Weight (NEW) in Ibs. | t (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 1.608E-04 | 1.608E-04 (q/m³//(q/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 ak Rate Dilution Factor => | 0.939 | | • | |
| | | A ANOUNING TRISURES OF | Testinesulia | 8/2% (S.) Sept. 1889 | Total Mass of Substance | Average Modeled | Substance |
| Č | Measured Action | | Average Adjusted | | Emitted (grams/ifem) | Concentration for | Emission Rate for |
| Compound | Concentration | Background Concentration | Emission Factor (lb/item) | Emission Factor | | (grams/m³) | (pes/g) |
| | (mg/m / | (mg/m³) | Ħ | (IONIO INEVA) | 2 | CONC | ER, |
| Gases | | | | | | | |
| NH3 | 3.570E+00 | NA | 4.120E-02 | 1.256E-02 | 1.869E+01 | 1.503E-03 | 9.344E+00 |
| CO2 | 5.580E+01 | NA | 6.440E-01 | 1.963E-01 | 2.921E+02 | 2.349E-02 | 1.461E+02 |
| 00 | 1.564E+02 | NA | 1.805E+00 | 5.503E-01 | 8.187E+02 | 6.583E-02 | 4.094E+02 |
| NOx (as NO) | 1.107E+00 | ΝΑ | 1.278E-02 | 3.895E-03 | 5.795E+00 | 4.659E-04 | 2.898E+00 |
| CH4 | 2.178E+00 | NA | Q | QN | QN | QN | QN |
| SO2 | 5.240E-01 | ΝΑ | Q | QN | QN | QN | QN |
| Combined Particulate | | | | | | | |
| TSP | 6.836E+00 | 5.300E-02 | 8.337E-02 | 2.542E-02 | 3.782E+01 | 3.040E-03 | 1.891E+01 |
| PM10 | 5.179E+00 | 4.233E-02 | 6.313E-02 | 1.925E-02 | 2.863E+01 | 2.302E-03 | 1.432E+01 |
| PM2.5 | 2.036E+00 | 2.400E-02 | 2.473E-02 | 7.539E-03 | 1.122E+01 | 9.018E-04 | 5.608E+00 |
| Metals | | | | | | | |
| Antimony | 1.859E-04 | 4.345E-06 | 2.231E-06 | 6.803E-07 | 1.012E-03 | 8.138E-08 | 5.061E-04 |
| Arsenic | 3.717E-04 | 3.091E-06 | 4.531E-06 | 1.381E-06 | 2.055E-03 | 1.652E-07 | 1.028E-03 |
| Barium | 9.513E-03 | 3.255E-05 | 1.165E-04 | 3.552E-05 | 5.285E-02 | 4.249E-06 | 2.643E-02 |
| Beryllium | 7.873E-05 | 1.649E-06 | Q | Q | ND | QN | QN |
| Cadmium | 1.608E-04 | 1.649E-06 | 1.976E-06 | 6.024E-07 | 8.962E-04 | 7.206E-08 | 4.481E-04 |
| Chromium | 1.400E-03 | 7.167E-06 | 1.711E-05 | 5.218E-06 | 7.763E-03 | 6.241E-07 | 3.881E-03 |
| Cobait | 1.247E-04 | 3.763E-06 | 1.486E-06 | 4.530E-07 | 6.740E-04 | 5.419E-08 | 3.370E-04 |
| Copper | 1.115E+00 | 1.159E-03 | 1.370E-02 | 4.175E-03 | 6.212E+00 | 4.995E-04 | 3.106E+00 |
| Lead | 2.187E-02 | 6.770E-05 | 2.680E-04 | 8.170E-05 | 1.215E-01 | 9.773E-06 | 6.077E-02 |
| Manganese | 4.046E-03 | 3.086E-05 | 4.935E-05 | 1.504E-05 | 2.238E-02 | 1.800E-06 | 1.119E-02 |
| Nickel | 2.515E-03 | 1.433E-05 | 3.073E-05 | 9.370E-06 | 1.394E-02 | 1.121E-06 | 6.970E-03 |
| Selenium | 2.624E-04 | 5.497E-06 | QN | QN | QN | QN | QN |
| Silver | 6.997E-05 | 1.099E-06 | 8.600E-07 | 2.622E-07 | 3.901E-04 | 3.136E-08 | 1.950E-04 |
| Thallium | 7.873E-05 | 1.613E-06 | ΩN | QN | QN | ND | QN |
| Zinc | 1.596E-01 | 1,445E-04 | 1.960E-03 | 5.977E-04 | 8.892E-01 | 7.149E-05 | 4.446E-01 |
| Footnotes: | .: | | | | | | |

Footnotes: 'ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study)
ND = Not Detected

Table B-2: Air Modeling Output Data for Volatile Organic Compounds - 100 meter location

| | 155mm | propelling charge | 155mm propelling charge M3 (zone 3), M199 cannon |) cannon | No. of rounds (1) | 1 | rounds |
|---------------------------------------|----------------------------------|--|--|-------------------------------------|--------------------------|--|---|
| | • | DODI | DODIC: D540 | | release duration (t): | 2 | seconds |
| | e Z | Net Explosive Weight (NEW) in lbs. Number of items = 1 | ve Weight (NEW) in lbs. => Number of items = 1 | 3.28 | Unit Concentration (UC): | 1.608E-04 | 1.608E-04 (g/m³)/(g/s) |
| | | SF6 Leak Rate D | Leak Rate Dilution Factor => | 0.939 | | | |
| | | en e | restrikasulia usta | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background | justed | Average Adjusted Emission Factor | Emitted (grams/item) | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) |
| | (mg/m³) | (mg/m³) | EF EF | (Ib/Ib NEW) | \(\frac{1}{2}\) | CONC | ER, |
| VOCs | | | | | | | |
| Dichlorodifluoromethane | 3.762E-03 | 3.762E-03 | Q | QN | ND | QN | QN |
| Methyl Chloride | 1.594E-03 | 1.594E-03 | QN | QN | ND | ND | QN |
| Dichlorotetrafluoroethane | 4.683E-03 | 4.683E-03 | QN | QN | ON | ON | QN |
| Vinyl Chloride | 5.069E-03 | 5.069E-03 | Q | QV | ND | QN | QN |
| 1,3-Butadiene | 1.790E-03 | 1.790E-03 | Q | QN | QN | QN | QN |
| Methyl Bromide | 3.073E-03 | 3.073E-03 | 2 | Q | ΩN | QN N | Q |
| Ethyl Chloride | 2.112E-03 | 2.112E-03 | Q | QN | QN | QQ | ΩΩ |
| Trichlorofluoromethane | 3.934E-03 | 3.934E-03 | Q | Q | QN | QN | QN |
| 1,1-Dichtoroethene | 9.028E-03 | 6.696E-03 | 2.867E-05 | 8.739E-06 | 1.300E-02 | 1.045E-06 | 6.501E-03 |
| Dichloromethane | 1.607E-01 | 5.722E-03 | 1.904E-03 | 5.806E-04 | 8.638E-01 | 6.945E-05 | 4.319E-01 |
| 3-Chloropropene | 2.754E-03 | 2.754E-03 | QN | ND | QN | ND | QN |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 4.965E-03 | 5.750E-03 | Q | QN | QN | ND | QN |
| 1,1-Dichtoroethane | 3.159E-03 | 3.159E-03 | Q | Q | QN | QN | QN |
| cis-1,2-Dichloroethene | 3.295E-03 | 3.295E-03 | 2 | Q | ND | ND | Q |
| Trichloromethane | 4.099E-03 | 4.099E-03 | Q | Q | QN | ON | QN |
| 1,2-Dichloroethane | 3.443E-03 | 3.443E-03 | Q | QN | QN | QN | QN |
| 1,1,1-Trichloroethane | 2.007E-02 | 1.095E-01 | 2 | Q | QN | QN | QN |
| Benzene | 5.931E-02 | 2.329E-03 | 7.290E-04 | 2.223E-04 | 3.307E-01 | 2.659E-05 | 1.653E-01 |
| Carbon Tetrachloride | 4.529E-03 | | Q | QN | QN | QN | QN |
| 1,2-Dichloropropane | 3.419E-03 | | Q | Q | QN | ND | QN |
| Trichloroethene | 3.866E-03 | 3.866E-03 | SD | QN | . ON | ND | QN |
| cis-1,3-Dichloropropene | 3.360E-03 | 3.360E-03 | QN | QN | , QN | QN | QN |
| trans-1,3-Dichloropropene | 2.860E-03 | 2.860E-03 | ON | QN | QN | ND | QN |
| 1,1,2-Trichloroethane | 3.877E-03 | 3.877E-03 | QN | ND | QN | ND | QN |
| Toluene | 5.333E-03 | 3.610E-03 | 2.118E-05 | 6.456E-06 | 9.606E-03 | 7.723E-07 | 4.803E-03 |
| 1,2-Dibromoethane | 5.844E-03 | 5.844E-03 | QN | Q | QN | ND | ON |
| Tetrachloroethene | 4.475E-03 | 4.475E-03 | QN | QN | QN | ND | QN |
| | | | | | | | |

Table B-2: Air Modeling Output Data for Volatile Organic Compounds - 100 meter location

| | 155mm pro | ropelling charge | pelling charge M3 (zone 3), M199 cannon | 9 cannon | No. of rounds (I) | (| rounds |
|---------------------------|------------------|--|---|--|--------------------------|--------------------------------|--------------------------------|
| | | inon | | | release duration (v): | 7 | zeconds |
| | Net Net | Net Explosive Weight | plosive Weight (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 1.608E-04 | 1.608E-04 (g/m³)/(g/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 ak Rate Dilution Factor => | 0.939 | | | |
| | | | And Hither de Nice office | | Total Mass of Substance | Average Modeled | Substance |
| | Mose prod Actual | Measured | Average Adjusted | A Control of the Cont | (grams/item) | Concentration for One Round | Emission Rate for One Round |
| Compound | Concentration | Background Concentration | Emission Factor (Ib/item) | Emission Factor | 20.00 | (grams/m³) | (a/sec) |
| | (mg/m³) | (mg/m³) | EF | (Ib/Ib NEW) | M | CONC | ER |
| Chlorobenzene | 2.305E-04 | 2.305E-04 | ON | QN | QN | QN | QN |
| Ethylbenzene | 2.344E-03 | 2.344E-03 | QN | QN | QN | QN | QN |
| m&p-Xylene | 2.257E-03 | 2.257E-03 | QN | QN | QN | ND | QN |
| Styrene | 2.641E-03 | 2.641E-03 | QN | QN | QN | ND | QN |
| 1,1,2,2-Tetrachloroethane | 4.466E-03 | 4.466E-03 | QN | QN | DN | QN | QN |
| o-Xylene | 2.474E-03 | 2.474E-03 | QN | QN | QN | QN | QN |
| 4-Ethyltoluene | 2.214E-03 | 2.214E-03 | 오 | QN | . GN | ON | ND |
| 1,3,5-Trimethylbenzene | 2.460E-03 | 2.460E-03 | Q | Q | QN | QN | ON |
| 1,2,4-Trimethylbenzene | 2.312E-03 | 2.312E-03 | Q | Q | QN | ON | QN |
| Benzyl Chloride | 5.076E-03 | 5.076E-03 | S | Q | QN | QN | ND |
| m-Dichlorobenzene | 3.366E-03 | 3.366E-03 | QN | QN | QN | QN | QN |
| p-Dichlorobenzene | 2.945E-03 | 2.945E-03 | Q | 2 | QN | QN | ND |
| o-Dichlorobenzene | 3.606E-03 | 3.606E-03 | QQ | 2 | QN | QN | QN |
| 1,2,4-Trichlorobenzene | 4.526E-03 | 4.526E-03 | QN | ΩN | QN | QN | ND ON |
| Hexachlorobutadiene | 4.690E-03 | 4.690E-03 | Q | Q | QN | QN | QN |
| Methane | 2.218E+00 | 1.364E+00 | 1.050E-02 | 3.202E-03 | 4.764E+00 | 3.831E-04 | 2.382E+00 |
| Ethane | 6.764E-01 | 6.764E-01 | QN | QN | QN | ND | QN |
| Ethylene | 6.310E-01 | 6.310E-01 | QN | QN | QN | ND | QN |
| Propane | 9.920E-01 | 9.920E-01 | ON | QN | ON | QN | QN |
| Acetylene | 5.858E-01 | 5.858E-01 | QN | QN | QN | QN | QN |
| Isobutane | 1.307E+00 | 1.307E+00 | ND | QN | ΟN | QN | QN |
| n-Butane | 1.307E+00 | 1.307E+00 | ND | QN | QN | QN | QN |
| Propylene | 9.466E-01 | 9.466E-01 | QN | QN | QN | QN | QN |
| | | | | | | | |

Footnotes:

¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

Table B-3: Air Modeling Output Data for Semi-Volatile Organic Compounds - 100 meter location

| | 155mm | oropelling charge | 155mm propelling charge M3 (zone 3), M199 cannon | 9 cannon | No. of rounds (I) | + | rounds |
|-----------------------------|----------------|------------------------------------|--|-----------------|--------------------------|-----------------------------|--------------------------------|
| | | DODIE | DODIC: D540 | | release duration (t): | 2 | seconds |
| | Ne | Net Explosive Weight (NEW) in lbs. | (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 1.608E-04 | 1.608E-04 (g/m³)/(g/s) |
| | | Number of SF6 Leak Rate D | Number of items = 1 eak Rate Dilution Factor => | 0.939 | | | |
| | | 100 | Tastikasunsi. | | Total Mass of Substance | Average Modeled | Substance |
| | Control of the | Measured | Average Adjusted | | Emitted (grams/item) | Concentration for One Round | Emission Rate for One Round |
| Compound | Concentration | Background Concentration | Emission Factor | Emission Factor | | (grams/m³) | (a/sec) |
| | (mg/m³) | (mg/m ₃) | H H | (lb/lb NEW) | W | CONC | n A |
| SVOCs | | | | | | | |
| n-nitrosodimethylamine | 2.355E-03 | 5.605E-05 | QN | ON | QN | ON. | QN |
| bis(2-chloroethyl)ether | 2.355E-03 | 5.605E-05 | ΩN | QN | QN | ON | QN |
| phenol | 7.294E-03 | 7.120E-03 | 2.148E-06 | 6.548E-07 | 9.742E-04 | 7.833E-08 | 4.871E-04 |
| 2-chlorophenol | 2.355E-03 | 5.605E-05 | QN | QN | ND | QN | QN |
| 1,3-dichlorobenzene | 2.355E-03 | 5.605E-05 | Q | QN | ND | QN | QN |
| 1,4-dichlorobenzene | 2.355E-03 | 5.664E-05 | QN | QN | ND | QN | QN |
| 1,2-dichlorobenzene | 2.355E-03 | 5.605E-05 | Q | Q | ND | ND | QN |
| benzyl alcohol | 2.355E-03 | 5.605E-05 | Q | QN | ND | QN | QN |
| bis(2-chlorolsopropyl)ether | 2.355E-03 | 5.605E-05 | QN | QN | QN | QN | QN |
| 2-methylphenol | 2.355E-03 | 5.605E-05 | QN | QN | ND | QN | QN |
| hexachloroethane | 2.355E-03 | 5.605E-05 | Q | Q | QN | Q | Q |
| n-nitroso-di-n-propylamine | 2.355E-03 | 5.605E-05 | Q | QN | ND | QN | ND |
| 4-methylphenol | 2.355E-03 | 5.605E-05 | QN | SD | ND | ON | QN |
| nitrobenzene | 2.355E-03 | 5.605E-05 | QN | QN | ND | QN | QN |
| isophorone | 2.355E-03 | 5.605E-05 | Q | QN | ND | QN | QN |
| 2-nitrophenol | 2.355E-03 | 3.660E-04 | Q | Q | QN | QN | 2 |
| 2,4-dimethylphenol | 2.355E-03 | 5.605E-05 | Q | Q | QN | QN | Q |
| bis(2-chloroethoxy)methane | 2.355E-03 | 5.605E-05 | Q | QN | QN | QN | Q |
| 2,4-dichlorophenol | 2.355E-03 | 5.605E-05 | QN | Q | QN | Q | QN |
| 1,2,4-trichlorobenzene | 2.355E-03 | 5,605E-05 | QN | Q | QN | Q. | ΔN |
| naphthalene | 3.597E-03 | 1.366E-04 | 4,253E-05 | 1.297E-05 | 1.929E-02 | 1.551E-06 | 9.647E-03 |
| 4-chloroaniline | 2.355E-02 | 5.605E-04 | QN | 2 | QN | QN | QN |
| hexachlorobutadiene | 2.355E-03 | 5.605E-05 | ND | Q | ND | ON | QN |
| 4-chloro-3-methylphenol | 2.355E-03 | 5.605E-05 | QN | Q | ND | QN . | QN |
| 2-methylnaphthalene | 2:355E-03 | 1.694E-04 | QN | ΩN | ON | ND | QN |
| hexachlorocyclopentadiene | 2.355E-03 | 5.605E-05 | Q | Q | QN | ON | QN |
| 2,4,6-trichlorophenol | 2.355E-03 | 5.605E-05 | QQ | Q | QN | QN. | Q |

Table B-3: Air Modeling Output Data for Semi-Volatile Organic Compounds - 100 meter location

| | 155mm prop | propelling charge DODK | elling charge M3 (zone 3), M199 cannon DODIC: D540 | 9 cannon | No. of rounds (i) release duration (t): | 1 | 1 rounds |
|----------------------------|---|--|---|--|--|---|--|
| | Ne | Net Explosive Weight (NEW) in fbs. Number of items = 1 SF6 Leak Rate Dilution Factor | ve Weight (NEW) in lbs. => Number of items = 1 ak Rate Dilution Factor => | 3.28 | Unit Concentration (UC): | 1.608E-04 | 1.608E-04 (g/m³)/(g/s) |
| | | | A CHINGTOS CRESUIS | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (lb/item) EF | Average Adjusted Emission Factor (ib/ib NEW) | Emitted (grams/item) M | Concentration for One Round (grams/m³) CONC | Emission Rate for One Round (g/sec) ER, |
| 2,4,5-trichlorophenol | 2.355E-03 | 5.605E-05 | QN | QN | QN | QN | GN |
| 2-chloronaphthalene | 2.355E-03 | 5.605E-05 | QN | QN | QN | QN | QN |
| 2-nitroaniline | 2.355E-03 | 5.605E-05 | QN | QN | QN | QN | S |
| dimethylphthalate | 2.355E-03 | 5.605E-05 | QN | QN | QN | QN | QN. |
| 2,6-dinitrotoluene | 2.355E-03 | 5.721E-05 | QN | QN | ON | QN | QV |
| 3-nitroaniline | 4.710E-03 | 1.121E-04 | QN | QN | ON | S | QN |
| 2,4-dinitrophenol | 4.710E-03 | 1.121E-04 | Q | QN | QN | QN | Q |
| dibenzofuran | 2.355E-03 | 7.823E-05 | QN | QN | QN | QN | Q |
| 2,4-dinitrotoluene | 2.355E-03 | 5.605E-05 | Q | QN | QN | ND | Q |
| 4-nitrophenol | 4.710E-03 | 1.316E-04 | QN | QN | ND | ND | ON. |
| 4-chlorophenyl-phenylether | 2.355E-03 | 5.605E-05 | Q | Q | ND | QN | QN |
| diethylphthalate | 2.355E-03 | 5.605E-05 | Q | Q | ON | QN | QN |
| 4-nitroaniline | 4.710E-03 | 1.121E-04 | Q | S | ON | ND | QN |
| 4,5-dinitro-z-methylphenol | 4.710E-03 | 1.121E-04 | Q | Q | ON | ND | QN |
| n-nitrosodiphenylamine(1) | 2.355E-03 | 5.605E-05 | 2 | QN | ND | QN | QN |
| 4-bromophenyi-phenylether | 2.355E-03 | 5.605E-05 | Q | QN | ND | ON | Q |
| hexachlorobenzene | 2.355E-03 | 5.605E-05 | QN | QN | ON | QN | QN |
| pentachlorophenol | 4.710E-03 | 1.121E-04 | Q | QN | QN | QN | QN. |
| di-n-butylphthalate | 2.355E-03 | 1.080E-04 | QN | QN | QN | QN | QN |
| butylbenzylphthalate | 2.355E-03 | 5.605E-05 | Q | ON | QN | QV | Q |
| bis(2-ethythexyl)phthalate | 1.526E-01 | 9.023E-04 | 1.865E-03 | 5.685E-04 | 8.458E-01 | 6.801E-05 | 4.229E-01 |
| di-n-octylphthalate | 2.355E-03 | 5.605E-05 | QN | QN | QN | QN | Q |
| Footnotes: | | | | | | | |

Footnotes: ¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

Table B-4: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases

| | | ALLEGO COLLEGES | 2 12 (2 out 2) 2 12 1 | - ucuros | No of rounds (1) | | rounds |
|------------------------|----------------------------------|--------------------------|-------------------------------------|----------------------------------|--------------------------|-------------------------|--------------------------------|
| | | | DODIC: D540 | | release duration (t): | 2 | seconds |
| | eN | Net Explosive Weight | osive Weight (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 1.608E-04 | 1.608E-04 (g/m³)/(g/s) |
| | | | | 6 | | | |
| | | | Leak Kate Ullution Factor | 0.939 | | | |
| | | A CONTROL | Megalider/Orderman | | Total Mass of Substance | Average Modeled | Substance Emission Rate for |
| Compound | Measured Actual Concentration | Measured Background | Average Adjusted Emission Factor | Average Adjusted Emission Factor | (grams/Item) | One Round (grams/m³) | One Round (g/sec) |
| | (mg/m³) | Concentration (mg/m³) | (lb/item) EF | (Ib/Ib NEW) | W | CONC | ER, |
| PAHs (TO-13 Method) | | | | • | | | |
| acenaphthylene | 4.939E-04 | 1.328E-06 | 6.054E-06 | 1,846E-06 | 2.746E-03 | 2.208E-07 | 1.373E-03 |
| acenaphthene | 1.464E-04 | 9.544E-05 | 6.269E-07 | 1.911E-07 | 2.843E-04 | 2.286E-08 | 1,422E-04 |
| fluorene | 2.220E-04 | 6.502E-05 | 1.930E-06 | 5.884E-07 | 8.754E-04 | 7.038E-08 | 4.377E-04 |
| phenanthrene | 5.217E-04 | 6.428E-05 | 5.622E-06 | 1.714E-06 | 2.550E-03 | 2.050E-07 | 1.275E-03 |
| anthracene | 5.075E-05 | 4.197E-06 | 5.721E-07 | 1.744E-07 | 2.595E-04 | 2.087E-08 | 1.298E-04 |
| fluoranthene | 3.162E-04 | 7.852E-06 | 3.790E-06 | 1.155E-06 | 1.719E-03 | 1.382E-07 | 8.594E-04 |
| pyrene | 8.843E-04 | 6.908E-06 | 1,078E-05 | 3.288E-06 | 4.892E-03 | 3.933E-07 | 2.446E-03 |
| benzo(a)anthracene | 4.504E-05 | 1.390E-07 | 5.518E-07 | 1.682E-07 | 2.503E-04 | 2.012E-08 | 1.252E-04 |
| chrysene | 4.510E-05 | 3.878E-07 | 5.496E-07 | 1.676E-07 | 2,493E-04 | 2.004E-08 | 1.246E-04 |
| benzo(b)fluoranthene | 6.923E-05 | 2.220E-07 | 8.482E-07 | 2.586E-07 | 3.847E-04 | 3.093E-08 | 1.924E-04 |
| benzo(k)fluoranthene | 9.756E-05 | 9.826E-08 | 1.198E-06 | 3.652E-07 | 5.434E-04 | 4.369E-08 | 2.717E-04 |
| benzo(a)pyrene | 1.560E-04 | 8.980E-08 | 1.917E-06 | 5.843E-07 | 8.693E-04 | 6.989E-08 | 4.347E-04 |
| indeno(1,2,3-cd)pyrene | 2.926E-04 | 1.659E-07 | 3.595E-06 | 1.096E-06 | 1.630E-03 | 1.311E-07 | 8.152E-04 |
| dibenz(a,h)anthracene | 1,008E-05 | 5.605E-08 | 1.238E-07 | 3.776E-08 | 5.618E-05 | 4.517E-09 | 2.809E-05 |
| benzo(g,h,i)perylene | 6.659E-04 | 2.408E-07 | 8.181E-06 | 2.494E-06 | 3.711E-03 | 2.984E-07 | 1.856E-03 |
| Dioxin/Furan Data | | | | | | | |
| 2378-TCDD | 4.360E-10 | 8.000E-12 | 5.359E-12 | 1.634E-12 | 2.431E-09 | 1.954E-13 | 1.215E-09 |
| 12378-PECDD | 1.341E-09 | 9.000E-12 | 1.637E-11 | 4.991E-12 | 7.426E-09 | 5.970E-13 | 3.713E-09 |
| 123478-HXCDD | 1.989E-09 | 1.050E-11 | 2.445E-11 | 7.453E-12 | 1.109E-08 | 8.915E-13 | 5.544E-09 |
| 123678-HXCDD | 5.812E-09 | 1.700E-11 | 7.122E-11 | 2.171E-11 | 3.230E-08 | 2.597E-12 | 1.615E-08 |
| 123789-HXCDD | 5.536E-09 | 1.550E-11 | 6.785E-11 | 2.068E-11 | 3.077E-08 | 2.474E-12 | 1.539E-08 |
| 1234678-HPCDD | 1.137E-07 | 2.495E-10 | 1.395E-09 | 4.252E-10 | 6.327E-07 | 5.087E-11 | 3.163E-07 |
| ОСDD | 6.470E-07 | 1.587E-09 | 7.932E-09 | 2.418E-09 | 3.598E-06 | 2.893E-10 | 1.799E-06 |
| 2378-TCDF | 1.560E-10 | 1.100E-11 | 1.782E-12 | 5.433E-13 | 8.084E-10 | 6.499E-14 | 4.042E-10 |
| 12378-PECDF | 2.870E-10 | 1.050E-11 | ON | QN | QN | Q | Q |
| 23478-PECDF | 1.870E-10 | 1.550E-11 | 2.108E-12 | 6.427E-13 | 9.561E-10 | 7.687E-14 | 4.781E-10 |
| 123478-HXCDF | 3.965臣-10 | 2.800E-11 | 4,529E-12 | 1.381E-12 | 2.054E-09 | 1.652E-13 | 1.027E-09 |
| 123678-HXCDF | 2.380E-10 | 1.450E-11 | 2.747E-12 | 8.375E-13 | 1.246E-09 | 1.002E-13 | 6.230E-10 |
| 123789-HXCDF | 3.015E-10 | 6.000E-12 | QN | QN | QN | QN | NO |

Table B-4: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases 100 meter location

| | 155mm prop | propelling charge | elling charge M3 (zone 3), M199 cannon | 9 cannon | No. of rounds (i) | 1 | rounds |
|--------------------------|---|--|--|--------------------|--------------------------|--------------------------------|--------------------------------|
| | | igog | DODIC: D540 | | release duration (t): | 2 | seconds |
| | N N | Net Explosive Weight (NEW) in Ibs. | t (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 1.608E-04 | 1.608E-04 (g/m³)/(g/s) |
| | | Number of items = 1 SF6 Leak Rate Dilution Factor | Number of items = 1 ak Rate Dilution Factor => | 0.939 | | | |
| | 101000000000000000000000000000000000000 | A A CONTINUE | ATC FITTING LAKER WATER SA | | Total Mass of Substance | Average Modeled | Substance |
| | Measured Actual | Measured | Average Adjusted | potanip V captorio | Emitted (grams/item) | Concentration for One Round | Emission Rate for One Round |
| Compound | Concentration | Background Concentration | Emission Factor (Ib/item) | Emission Factor | | (grams/m³) | (ces/6) |
| | (mg/m²) | (mg/m ₃) | 1 | (Ib/Ib NEW) | Σ | CONC | ER |
| 234678-HXCDF | 2.450E-10 | 1.200E-11 | QN | · QN | QN | ON | ND |
| 1234678-HPCDF | 4.119E-09 | 7.750E-11 | 4.967E-11 | 1.514E-11 | 2.253E-08 | 1.811E-12 | 1.126E-08 |
| 1234789-HPCDF | 6.770E-10 | 8.000E-12 | 8.223E-12 | 2.507E-12 | 3.730E-09 | 2.999E-13 | 1.865E-09 |
| OCDF | 1.221E-08 | 1.105E-10 | 1.488E-10 | 4.536E-11 | 6.748E-08 | 5.425E-12 | 3.374E-08 |
| Aldehydes | | | | | | | |
| Formaldehyde | 1.228E-02 | 1.228E-02 | Q | QN | QN | 2 | QV |
| Acetaldehyde | 1.802E-02 | 1.802E-02 | 2 | QN | . QN | QN | Q |
| Acetone | 2.375E-02 | 4.751E-02 | ON . | QN | QN | 2 | QN |
| Acrolein | 2.294E-02 | 2.294E-02 | QN | QN | QN | Q | QV |
| Proprionaldehyde | 2.374E-02 | 2.374E-02 | ON. | QN | QN | QN | QN |
| Crotonaldehyde | 2.867E-02 | 2.867E-02 | Q | S | ND | QN | QN |
| Butyraldehyde | 2.949E-02 | 2.949E-02 | QN | QN | QN | QN | Q |
| Benzaldehyde | 4.340E-02 | 4.340E-02 | QN | Q | ND | QN | QN |
| Isovaleraldehyde | 3.523E-02 | 3.523E-02 | 2 | Q | ND | QN | Q |
| Valeraldehyde | 3.523E-02 | 3.523E-02 | QN | QN | ND | QN | QN |
| o,m,p-Tolualdehyde | 1.229E-01 | 9.828E-02 | QN | Q | QN | ND | QN |
| Hexaldehyde | 4.097E-02 | 4.097E-02 | QN | Q | ND | ON | QN |
| 2,5-Dimethylbenzaldehyde | 4.097E-02 | 4.097E-02 | Q | Q | QN | QN | QN |
| Acid gases | | | | | | | |
| Hydrogen fluoride | 1.400E-01 | 1.400E-01 | QN | QN | DN | QN | Q |
| Hydrogen chloride | 1.300E-01 | 1.300E-01 | QN ON | QN | QN | QN | QN |
| Hydrogen bromide | 1.400E-01 | 1.400E-01 | QN | ΩN | QN | ΩN | Q. |
| Nitric Acid | 1.400E-01 | 1.400E-01 | ND | S | QN | QN | S |
| Phosphoric acid | 1.400E-01 | 1.400E-01 | QN | QN | QN | QN | QN |
| Sulfuric Acid | 1.400E-01 | 1.400E-01 | QN | QN | QN | QN | Q |
| Footpotes. | | | | | | | |

Footnotes: 'ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

| ation | |
|-------------------|--|
| - 100 meter loca | |
| and Energetics | |
| ata for Cyanide | |
| eling Output Da | |
| able B-5: Air Mod | |
| <u>=</u> | |

| | 155mm | propelling charge | 155mm propelling charge M3 (zone 3), M199 cannon | 9 cannon | No. of rounds (1) | | rounds |
|-----------------------------|-----------------------|------------------------------------|--|------------------|--------------------------|--|---|
| | | laoa | DODIC: D540 | | release duration (t): | 2 | 2 seconds |
| | Ne. | Net Explosive Weight (NEW) in lbs. | t (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 1.608E-04 | 1.608E-04 (g/m³)/(g/s) |
| | | | | 6 | | | , ? |
| | | SFO LEAK RATE D | Leak Kate Dilution Factor => | 0.939 | | | |
| | A STATE OF THE PARTY. | C. ATCIFITING | TC/FITING/Test Results 🧽 | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual | Measured Background | Average Adjusted Emission Factor | Average Adjusted | Emitted (grams/item) | Concentration for One Round (grams/m³) | Emission Rate for One Round (q/sec) |
| | (mg/m ₃) | Concentration (mg/m³) | (lb/item) EF | (Ib/Ib NEW) | > | CONC | ER. |
| Particulate Cyanide and HCN | | | | | | | |
| Particulate Cyanide | 8.000E-02 | 8.000E-02 | QN | QN | QN | QN | 9 |
| Hydrogen Cyanide | 9.500E-01 | 8.500E-02 | 1.168E-02 | 3.560E-03 | 5.296E+00 | 4.258E-04 | 2.648E+00 |
| Energetics Data | | | | | | | |
| Nitrobenzene | 5.021E-01 | 2.031E-01 | ΩN | QN | QN | S | Q. |
| 2-Nitrotoluene | 5.021E-01 | 2.031E-01 | QN | QN | QN | QN | Q |
| 3-Nitrotoluene | 5.021E-01 | 2.031E-01 | QN | QN | QN | Q | Q |
| 4-Nitrotoluene | 5.021E-01 | 2.031E-01 | QN | QN | QN | 9 | QN |
| Nitroglycerine | 5.021E-01 | 2.031E-01 | QN | QN | ND | Q | S |
| 1,3-Dinitrobenzene | 5.021E-01 | 2.031E-01 | QN | QN | QN | 9 | Q |
| 2,6-Dinitrotoluene | 5.021E-01 | 2.031E-01 | QN | QN | QN | Q | Q |
| 2,4-Dinitrotoluene | 5.021E-01 | 2.031E-01 | QN | QN | QN | QV | QN |
| 1,3,5-Trinitrobenzene | 5.021E-01 | 2.031E-01 | QN | QN | QN | Q | QN |
| 2,4,6-Trinitrotoluene | 5.021E-01 | 2.031E-01 | QN | QN | QN | QN | QN |
| RDX | 5.021E-01 | 2.031E-01 | QN | QN | ON | QN | ND |
| 4-Amino-2,6-Dinitrotoluene | 5.021E-01 | 2.031E-01 | QN | QN | QN | QN | QN |
| 2-Amino-4,6-Dinitrotoluene | 5.021E-01 | 2.031E-01 | QN | QN | ON | QN | Q |
| Tetryl | 5.021E-01 | 2.031E-01 | QN | QN | ON | QN | QN |
| НМХ | 1.004E+00 | 4.062E-01 | QN | ND ND | ND | QN | Q |
| Pentaerythritoltetranitrate | 1.004E+00 | 4.062E-01 | QN | QN | ND | QN | Q |
| Dibutyl phthalate | 2.510E+01 | 1.016E+01 | Q | QN | ND | QN | QN |
| Dioctyi phthalate | 2.510E+01 | 1.016E+01 | Q | QN | ND | QN | QN |
| Diphenylamine | 1.255E+01 | 5.078E+00 | QN | QN | QN | QN | QN |
| Costnoton | | | | | | | |

Footnotes: ^IATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

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AIR MODELING OUTPUT DATA FOR CHARGE M3, FIRED FROM THE M199 CANNON, ZONE 3, 200 METERS DOWNWIND

Table B-6: Air Modeling Output Data for Gases, Metals, and Particulates - 200 meter location

| | 155mm p | propelling charge | 155mm propelling charge M3 (zone 3), M199 cannon กฎกค. กรสถ | eannon eannon | No. of rounds (I) | 1 | rounds |
|--|---------------------|--|--|--|--|-------------------|--------------------------------|
| | | | | | יייי מיייייייייייייייייייייייייייייייי | 1 1 | Spiloss . |
| | eV . | Net Explosive Weight (NEW) in Ibs. | (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 6.914E-05 | 6.914E-05 (g/m³)/(g/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 ak Rate Dilution Factor => | 0.939 | | | |
| | | | The State of the Particular | No. of Particular Street, or other Particular Street, or o | Total Man of Orhados | Polobold opposit | Outotodo |
| | | WANGE LEIGHBO | ZATE GOOD BEET OF THE STATE | Services control of the services | lotal Mass of Substance | Concentration for | Substance Emission Rate for |
| | Meseured Actual | Measured | - | Average Adhiefed | (grams/Item) | One Round | One Round |
| Compound | Concentration | Background | Emission Factor | Emission Factor | | (grams/m³) | (d/sec) |
| | (mg/m³) | (mg/m³) | (ID/Melin) EF | (Ib/Ib NEW) | . W | CONC | ER, |
| Gases | | | | | | | |
| NH3 | 3.570E+00 | NA | 4.120E-02 | 1.256E-02 | 1.869E+01 | 3.230E-04 | 4.672E+00 |
| CO2 | 5.580E+01 | NA | 6.440E-01 | 1.963E-01 | 2.921E+02 | 5.049E-03 | 7.303E+01 |
| 00 | 1.564E+02 | ΝA | 1.805E+00 | 5.503E-01 | 8.187E+02 | 1.415E-02 | 2.047E+02 |
| NOx (as NO) | 1.107E+00 | NA | 1.278E-02 | 3.895E-03 | 5.795E+00 | 1.002E-04 | 1.449E+00 |
| CH4 | 2.178E+00 | NA | QN | dΝ | QN | ND | QN |
| SO2 | 5.240E-01 | NA | <u>Q</u> | QN | QN | <u>N</u> | Q |
| Combined Particulate | | | | | | | |
| TSP | 6.836E+00 | 5.300E-02 | 8.337E-02 | 2.542E-02 | 3.782E+01 | 6.536E-04 | 9.454E+00 |
| PM10 | 5.179E+00 | 4.233E-02 | 6.313E-02 | 1.925E-02 | 2.863E+01 | 4.949E-04 | 7.159E+00 |
| PM2.5 | 2.036E+00 | 2.400E-02 | 2.473E-02 | 7.539E-03 | 1.122E+01 | 1.939E-04 | 2.804E+00 |
| Metals | | | | | | | |
| Antimony | 1.859E-04 | 4.345E-06 | 2.231E-06 | 6.803E-07 | 1.012E-03 | 1.750E-08 | 2.530E-04 |
| Arsenic | 3.717E-04 | 3.091E-06 | 4.531E-06 | 1.381E-06 | 2.055E-03 | 3.552E-08 | 5.138E-04 |
| Barium | 9.513E-03 | 3.255E-05 | 1.165E-04 | 3.552E-05 | 5.285E-02 | 9.135E-07 | 1.321E-02 |
| Beryllium | 7.873E-05 | 1.649E-06 | QN | ΩN | QN | QN | 9 |
| Cadmlum | 1.608E-04 | 1.649E-06 | 1.976E-06 | 6.024E-07 | 8.962E-04 | 1.549E-08 | 2.241E-04 |
| Chromium | 1.400E-03 | 7.167E-06 | 1.711E-05 | 5.218E-06 | 7.763E-03 | 1.342E-07 | 1.941E-03 |
| Cobalt | 1.247E-04 | 3.763E-06 | 1.486E-06 | 4.530E-07 | 6.740E-04 | 1.165E-08 | 1.685E-04 |
| Copper | 1.115E+00 | 1.159E-03 | 1.370E-02 | 4.175E-03 | 6.212E+00 | 1.074E-04 | 1.553E+00 |
| Lead | 2.187E-02 | 6.770E-05 | 2.680E-04 | 8.170E-05 | 1.215E-01 | 2.101E-06 | 3.039E-02 |
| Manganese | 4.046E-03 | 3.086E-05 | 4.935E-05 | 1.504E-05 | 2.238E-02 | 3.869E-07 | 5.596E-03 |
| Nickel | 2.515E-03 | 1.433E-05 | 3.073E-05 | 9.370E-06 | 1.394E-02 | 2.410E-07 | 3.485E-03 |
| Selenium | 2.624E-04 | 5.497E-06 | ON | QN | ΩN | ON | ON |
| Silver | 6.997E-05 | 1.099E-06 | 8.600E-07 | 2.622E-07 | 3.901E-04 | 6.743E-09 | 9.752E-05 |
| Thallium | 7.873E-05 | 1.613E-06 | QN | QN | QN | QN | QN |
| Žinc | 1.596E-01 | 1,445E-04 | 1.960E-03 | 5.977E-04 | 8.892E-01 | 1.537E-05 | 2.223E-01 |
| Footnotes: | . | | | | | | |
| ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) | (for additional inf | ormation on the | data, refer to the | Firing Point Emis | sions Study) | | |
| ND = Not Detected | | | • |) | | | |
| | | | | | | | |

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Table B-7: Air Modeling Output Data for Volatile Organic Compounds - 200 meter location

| | 155mm | propelling charge | 155mm propelling charge M3 (zone 3), M199 cannon | 9 cannon | No. of rounds (I) | 1 | rounds |
|---------------------------------------|----------------------------------|---|--|-------------------------------------|--------------------------|-------------------------|------------------------|
| | | NGOO | DODIC: D540 | | release duration (t): | 4 | seconds |
| | eN. | Net Explosive Welght | osive Weight (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 6.914E-05 | 6.914E-05 (g/m³)/(g/s) |
| | | Number o | Number of items = 1 | 0.939 | | | |
| | Sind to the paid of | | | | Total Mass of Substance | Average Modeled | Substance |
| | Part of a Cheshody day | THE ASSESSMENT OF THE PARTY OF | A MANAGER STATE OF ST | | Emitted | Concentration for | Emission Rate for |
| Compound | Measured Actual Concentration | Measured Background | Average Adjusted Emission Factor | Average Adjusted Emission Factor | (grams/ltem) | One Round (grams/m³) | One Round (g/sec) |
| | (mg/m³) | (mg/m³) | EF | (lb/lb NEW) | N | CONC | ER, |
| VOCs | | | | | | | |
| Dichlorodifluoromethane | 3.762E-03 | 3.762E-03 | QN | QN | ON | ND | Q |
| Methyl Chloride | 1.594E-03 | 1.594E-03 | QN | QN | ON | ND | Q. |
| Dichlorotetrafluoroethane | 4.683E-03 | 4.683E-03 | QN | QN | ND | ND | S |
| Vinyl Chloride | 5.069E-03 | 5.069E-03 | QN | QN | ON | QN | QN |
| 1,3-Butadiene | 1.790E-03 | 1.790E-03 | QN | QN | NO | 2 | 2 |
| Methyl Bromide | 3.073E-03 | 3.073E-03 | QN | QN | NΩ | S | Q |
| Ethyl Chloride | 2.112E-03 | 2.112E-03 | QN | 2 | QN | QN | Q |
| Trichlorofluoromethane | 3.934E-03 | | ΩN | Q | ND | Q | 2 |
| 1,1-Dichloroethene | 9.028E-03 | 6.696E-03 | 2.867E-05 | 8.739E-06 | 1.300E-02 | 2.247E-07 | 3,251E-03 |
| Dichloromethane | 1.607E-01 | 5.722E-03 | 1.904E-03 | 5.806E-04 | 8.638E-01 | 1.493E-05 | 2.160E-01 |
| 3-Chloropropene | 2.754E-03 | 2.754E-03 | QN | QN | ND | ΔN | 9 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 4.965E-03 | 5.750E-03 | QN | QN | ND | ON | Q |
| 1,1-Dichloroethane | 3.159E-03 | 3.159E-03 | QN | QN | QN | QN | Q |
| cis-1,2-Dichtoroethene | 3.295E-03 | 3.295E-03 | QN | QN | QN | QN | 2 |
| Trichloromethane | 4.099E-03 | 4.099E-03 | ND | ON | QN | QN | 9 |
| 1,2-Dichloroethane | 3.443E-03 | 3.443E-03 | ON | QN | QN | QN | 2 |
| 1,1,1-Trichloroethane | 2.007E-02 | 1.095E-01 | QN | 2 | QN | QN | 2 |
| Benzene | 5.931E-02 | 2.329E-03 | 7.290E-04 | 2.223E-04 | 3.307E-01 | 5.716E-06 | 8.267E-02 |
| Carbon Tetrachloride | 4.529E-03 | 4.529E-03 | QN | QN | QN | QN | Q |
| 1,2-Dichloropropane | 3.419E-03 | 3.419E-03 | ND | Q | QN | QN | Q. |
| Trichloroethene | 3.866E-03 | 3.866E-03 | ON | ON | QN | QN | 2 |
| cis-1,3-Dichloropropene | 3.360E-03 | 3.360E-03 | QN | QN | QN | Q | 2 |
| trans-1,3-Dichloropropene | 2.860E-03 | 2.860E-03 | ON | QN | ND | QN | 2 |
| 1,1,2-Trichloroethane | 3.877E-03 | 3.877E-03 | QN | QN | QN | QN | Q |
| Toluene | 5,333E-03 | 3,610E-03 | 2.118E-05 | 6.456E-06 | 9.606E-03 | 1.660E-07 | 2.401E-03 |
| 1,2-Dibromoethane | 5.844E-03 | 5.844E-03 | Q | QN | QN | Q | QN |
| Tetrachloroethene | 4.475E-03 | 4.475E-03 | Q | QN | QN | QN | QN |
| | | | | | | | |

Table B-7: Air Modeling Output Data for Volatile Organic Compounds - 200 meter location

| | 155mm | propelling charge | 155mm propelling charge M3 (zone 3), M199 cannon | 9 cannon | No. of rounds (i) | * | rounds |
|---------------------------|-----------------|--|--|-------------------------------------|--------------------------|-------------------|------------------------|
| | | IOOO | | | release duration (t): | 4 | seconds |
| | e Z | Net Explosive Weigh | colosive Weight (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 6.914E-05 | 6.914E-05 (g/m³)/(g/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 k Rate Dilution Factor => | 0.939 | | | |
| | | | and the second | Some Services | Total Mass of Substance | Average Modeled | Substance |
| | Measured Actual | Measured | Average Adjusted | | Emitted (grame/item) | Concentration for | Emission Rate for |
| Compound | Concentration | Background Concentration | Emission Factor | Average Adjusted Emission Factor | (High Shell) | (grams/m³) | Orie Kound (g/sec) |
| | (mg/m³) | (mg/m³) | EF. | (Ib/Ib NEW) | Σ | CONC | ER, |
| Chlorobenzene | 2.305E-04 | 2.305E-04 | QN | QN | QN. | QN | CIN |
| Ethylbenzene | 2.344E-03 | 2.344E-03 | 오 | S | QN | CN | S |
| m&p-Xylene | 2.257E-03 | 2.257E-03 | QN | QN | QN | S. | Q |
| Styrene | 2.641E-03 | 2.641E-03 | Q | QN | QN | QN | Q |
| 1,1,2,2-Tetrachloroethane | 4.466E-03 | 4.466E-03 | Q | QN | QN | QN | QN |
| o-Xylene | 2.474E-03 | 2.474E-03 | QN | ON | QN | QN | Q |
| 4-Ethyltoluene | 2.214E-03 | 2.214E-03 | QN | QN | QN | Q | QN |
| 1,3,5-Trimethylbenzene | 2.460E-03 | 2.460E-03 | Q | QN | QN | QN. | QN |
| 1,2,4-Trimethylbenzene | 2.312E-03 | 2.312E-03 | Q | QN | QN | 2 | 2 |
| Benzyl Chloride | 5.076E-03 | 5.076E-03 | Q | QN | QN | 2 | QN |
| m-Dichlorobenzene | 3.366E-03 | 3.366E-03 | ΩN | QN | QN | 2 | QV |
| p-Dichlorobenzene | 2.945E-03 | 2.945E-03 | Q | ΩN | QN | QN | QV |
| 0-Ulchlorobenzene | 3.606E-03 | 3.606E-03 | 2 | QN | QN | QV | QN |
| Hexachlorchutadione | 4.526E-03 | 4.526E-03 | 2 | QN : | QN | ND | QN |
| Methane | 2.030E-03 | 4.690E-03 | ND 4 OFOE OS | ON COST | QN | Q. | ND |
| Ethane | 6 764E-04 | 8 784E 04 | 1.030E-02 | 3.2025-03 | 4.764E+00 | 8.235E-05 | 1.191E+00 |
| Ethylana | 6 340E-01 | 0.704E-01 | ON CIT | 2 2 | Q | Q | 2 |
| Dronana | 0.310E-01 | 0.3105-01 | | QN. | QN | ΩN | QN |
| i lopalia A collision | 9.920E-01 | 9.920E-01 | QN | <u>Q</u> | QN | S | S |
| Acetylene | 5.8581=-01 | 5.858E-01 | QN | <u>Q</u> | ND | QV | S |
| Isobutane | 1.307E+00 | 1.307E+00 | QN | Q | QN | Q | Q. |
| n-Butane | 1.307E+00 | 1.307E+00 | Q | QN | ON | Q | 2 |
| Propylene | 9.466E-01 | 9.466E-01 | ND | QN | ON | QN | Q |
| Footnotes: | | | | | | | |

Footnotes: ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

Table B-8: Air Modeling Output Data for Semi-Volatile Organic Compounds - 200 meter location

| | 155mm | propelling charge | 155mm propelling charge M3 (zone 3), M199 cannon | 9 cannon | No. of rounds (I) | ₹ · | rounds |
|-----------------------------|-------------------------------|------------------------|--|-------------------------------------|--------------------------|--------------------------------------|--------------------------------|
| | | DOD | DODIC: D540 | | release duration (t): | 4 | seconds |
| | S | Net Explosive Welgh | osive Weight (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 6.914E-05 | 6.914E-05 (g/m³)/(g/s) |
| | | | | 000 | | | |
| | | ·~ E | Leak Rate Dilution Factor | 0.838 | | | |
| | | Anne affine | wed althographics on the | | Total Mass of Substance | Average Modeled Concentration for | Substance Emission Rate for |
| Compound | Measured Actual Concentration | Measured Background | Average Adjusted Emission Factor | Average Adjusted Emission Factor | (grams/ltem) | One Round (grams/m³) | One Round (g/sec) |
| | (mg/m ₃) | (mg/m³) | EF | (lb/lb NEW) | M | CONC | ER, |
| SVOCs | | | | | | | 4 |
| n-nitrosodimethylamine | 2.355E-03 | 5.605E-05 | Q | Q | ON | Q | Q. |
| his/2-chloroethy/lather | 2.355E-03 | 5.605E-05 | 9 | QN | ND | 2 | QQ |
| Dis(z-Gilolosiiyi)siioi | 7.294E-03 | 7.120E-03 | 2.148E-06 | 6.548E-07 | 9.742E-04 | 1.684E-08 | 2.436E-04 |
| priend | 2.355E-03 | 5.605E-05 | QN | QN | ON | Q | 2 |
| 4 3-dichlorohenzene | 2.355E-03 | 5.605E-05 | QN | QN | ON | Q | 2 |
| 1 4-dichlorohanzana | 2,355E-03 | 5.664E-05 | QN | QN | QN | <u>Q</u> | QN : |
| 1 2-dichlorohanzana | 2,355E-03 | 5.605E-05 | QV | QN | QN | 2 | 2 |
| horavi alcohol | 2.355E-03 | 5.605E-05 | QN. | QN | QN | Q | 2 |
| his/2-chlorolsopropy/)ether | 2.355E-03 | 5.605E-05 | QN | QN | QN | Q | Q. |
| 2-methylphenol | 2.355E-03 | 5.605E-05 | QN | QN | QN | Q | |
| hevachloroethane | 2.355E-03 | 5.605E-05 | QN | ON | QN | QN | Q. |
| n-nitroso-di-n-nronvlamine | 2,355E-03 | 5.605E-05 | QN | ON | QN | 2 | Q. |
| 4-methylphanol | 2,355E-03 | 5.605E-05 | Q | ON | QN | Q | QN |
| nitrohanzana | 2.355E-03 | 5.605E-05 | QN | ND | QN | Q | QN |
| isonhorone | 2.355E-03 | 5.605E-05 | QN | QN | QN | 2 | QN |
| 2-nitrophenol | 2.355E-03 | 3.660E-04 | ND | QN | QN | Q S | Q S |
| 2,4-dimethylphenol | 2.355E-03 | 5.605E-05 | QN | Q | QN. | 2 2 | 2 2 |
| bis(2-chloroethoxy)methane | 2.355E-03 | 5.605E-05 | Q | Q S | | 2 2 | 2 2 |
| 2,4-dichlorophenol | 2.355E-03 | 5.605E-05 | Q | QN. | | | 2 2 |
| 1,2,4-trichlorobenzene | 2.355E-03 | 5.605E-05 | Q | Q | ON TOUR | ND CO | UND 1 0000 V |
| naphthalene | 3,597E-03 | 1.366E-04 | 4.253E-05 | 1.297E-05 | 1.929E-02 | 3.3335-07 | 4.0435-03 |
| 4-chloroaniline | 2.355E-02 | 5.605E-04 | QN | QN. | ON S | 2 2 | 2 2 |
| hexachtorobutadlene | 2.355E-03 | 5.605E-05 | Q | Q | ON. | | QN S |
| 4-chloro-3-methylphenol | 2.355E-03 | 5.605E-05 | QN | Q | QN | | |
| 2-methylnaphthalene | 2.355E-03 | 1.694E-04 | QN | 오 | QN | | 2 2 |
| hexachlorocyclopentadlene | 2.355E-03 | 5.605E-05 | QN | QN | QN | 2 | ON S |
| 2.4.6-trichlorophenol | 2.355E-03 | 5.605E-05 | Q. | Q | QN | ON | QN |
| | | | | | | | |

Table B-8: Air Modeling Output Data for Semi-Volatile Organic Compounds - 200 meter location

| | 155mm pro | propelling charg | pelling charge M3 (zone 3), M199 cannon DODIC: D540 | 9 cannon | No. of rounds (I) release duration (I): | 1 4 | rounds |
|--|--------------------------|--|--|--------------------------------|---|-----------------------------|--------------------------------|
| | eN. | Net Explosive Weight (NEW) in Ibs. | t (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 6.914E-05 | 6.914E-05 (a/m³)/(a/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 ak Rate Dilution Factor => | 0.939 | | | (2.6) / |
| | | ECOLUMNIE SYNC | | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual | Measured | Average Adjusted | Average Adjusted | Emitted (grams/item) | Concentration for One Round | Emlssion Rate for One Round |
| | Concentration (mg/m³) | Concentration (mg/m³) | (lb/ltem) | Emission Factor (lb/lb NEW) | ž | (grams/m³) | (ces/b) |
| | | | | | | CONC | Ž. |
| 2,4,5-trichlorophenol | 2.355E-03 | 5.605E-05 | QN | QN | QN | QN | CN |
| z-cnioronaphthalene | 2.355E-03 | 5.605E-05 | Q | QN | QN | Q | CN |
| z-nitroaniiine | 2.355E-03 | 5.605E-05 | Q | QN | QN | QN | S |
| dimetnyiphthalate | 2.355E-03 | 5.605E-05 | QN | QN | QN | ND | CN |
| z,b-dinitrotoluene | 2.355E-03 | 5.721E-05 | QN | QN | QN | QN | CN |
| 3-nitroaniline | 4.710E-03 | 1.121E-04 | Q | QN | QN | CN | S |
| 2,4-dinitrophenol | 4.710E-03 | 1.121E-04 | QN | QN | QN | QN | CN |
| uloenzoruran | 2.355E-03 | 7.823E-05 | S | Q | QN | 2 | CZ |
| z,4-dinitrotoluene | 2.355E-03 | 5.605E-05 | QN | QN | QN | QN. | Q |
| 4-nirropnenoi | 4.710E-03 | 1.316E-04 | QN | QN | QN | QN | Q |
| 4-cnloropnenyl-pnenyletner | 2.355E-03 | 5.605E-05 | Q | QN | QN | QN. | Q |
| diethylphthalate | 2.355E-03 | 5.605E-05 | Q | Q | QV | QN | QN ON |
| 4-muoalimite 4 6-dinitro-2-methyloborol | 4.710E-U3 | 1.121E-04 | Q. | 2 | QN | QN | QN |
| n-nitrosodinhenvlamine(1) | 7.7 105-03 | 1.121E-04 | Q S | Q | QN | QN | 9 |
| 4-hromonhanyl-nhanylather | 2.3335-03 | 3.003E-03 | 2 | QN | QN | QN | 2 |
| hexachlorohenzene | 2 3555-03 | 3.003E-05 | 2 2 | 2 | QN | QN ON | QN |
| pentachlorophonol | 4.333E-03 | 0.000000 | 2 | Q. | QN | QN | Q |
| dia hittigaphalata | 7.7 105-03 | 1.121E-04 | 2 | Q | ON | Q | 8 |
| ur-II-butyipilitialate | 2.355E-U3 | 1.080E-04 | Q | Q | QN | Q | QN |
| butyibelizyibiitialate | Z.355E-03 | 5.605E-05 | 2 | Q | QN | Q | 2 |
| ostz-eurymexyr)phmaiate | 1.526E-01 | 9.023E-04 | 1.865E-03 | 5.685E-04 | 8.458E-01 | 1.462E-05 | 2.115E-01 |
| di-n-octylpnmalate | 2.355E-03 | 5.605E-05 | QN | QN | ND | QN | 2 |
| Footnotes: | | | | | | | |

¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

1/16/01

Table B-9: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases 200 meter location

| | | | 842 (2000 2) 8410(| 0 cannon | No. of rounds (I) | _ | rounds |
|---|-----------------|------------------------------------|---|-------------------------------------|--------------------------|--------------------------------------|--------------------------------|
| | шшссі | propening criarge DODI(| 155mm propering cliarge ms (2016 5), mr. of commers | | release duration (t): | 4 | spuoses |
| | eN. | Net Explosive Weight (NEW) in Ibs. | t (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 6.914E-05 | 6.914E-05 (g/m³)/(g/s) |
| | | Number | | | | | |
| | | SF6 Leak Rate Dilution Factor | llution Factor => | 0.939 | | | |
| | | Manager late and the second | AMOVED | | Total Mass of Substance | Average Modeled Concentration for | Substance Emission Rate for |
| Compound | Measured Actual | Measured Background | Average Adjusted Emission Factor | Average Adjusted Emission Factor | (grams/Item) | One Round (grams/m³) | One Round (g/sec) |
| | (mg/m³) | Concentration (mg/m³) | (lb/ltem) EF | (Ib/Ib NEW) | Σ | CONC | ER, |
| PAHs (TO.43 Method) | | | | • | | 00 11171 | A 000 0 |
| acenaphthylene | 4.939E-04 | 1.328E-06 | . 6.054E-06 | 1.846E-06 | 2.746E-03 | 4.7475-00 | 7 1005-04 |
| acenanhthene | 1.464E-04 | 9.544E-05 | 6.269E-07 | 1.911E-07 | 2.843E-04 | 4.910E-09 | 7.109E-03 |
| Accordance | 2.220E-04 | 6.502E-05 | 1.930E-06 | 5.884E-07 | 8.754E-04 | 1.513E-08 | 2.188E-04 |
| hacionthrana | 5.217E-04 | 6.428E-05 | 5.622E-06 | 1.714E-06 | 2.550E-03 | 4.408E-08 | 90.3735-04 |
| prioritations | 5.075E-05 | 4.197E-06 | 5.721E-07 | 1.744E-07 | 2.595E-04 | 4.486E-09 | 0.488E-U3 |
| flioranthene | 3.162E-04 | 7.852E-06 | 3.790E-06 | 1.155E-06 | 1.719E-03 | 2.977E-08 | 4.29/E-04 |
| nacianimono | 8.843E-04 | 6.908E-06 | 1.078E-05 | 3.288E-06 | 4.892E-03 | 8.45515-08 | 7.2235-03 |
| benzo(a)anthracene | 4.504E-05 | 1,390E-07 | 5.518E-07 | 1.682E-07 | 2.503E-04 | 4.327E-09 | 0.230E-U3 |
| chryene | 4.510E-05 | 3.878E-07 | 5.496E-07 | 1.676E-07 | 2.493E-04 | 4.3090-09 | 0.232E-03 |
| henzo(h)filoranthene | 6.923E-05 | 2.220E-07 | 8.482E-07 | 2.586E-07 | 3.847E-04 | 6.650E-09 | 9.0105-03 |
| bonzo(k)filoranthene | 9.756E-05 | 9.826E-08 | 1.198E-06 | 3.652E-07 | 5.434E-04 | 9.392E-09 | 1.358E-04 |
| Delizo(n)incolaring | 1.560E-04 | 8.980E-08 | 1.917E-06 | 5.843E-07 | 8.693E-04 | 1.503E-08 | 2.1/3E-04 |
| Delizo(a)pyrelie | 2 926E-04 | 1.659E-07 | 3.595E-06 | 1.096E-06 | 1.630E-03 | 2.818E-08 | 4.076E-04 |
| Illuello(1,4,3-cu)pyrelle | 1 008E-05 | 5.605E-08 | 1.238E-07 | 3.776E-08 | 5.618E-05 | 9.710E-10 | 1.404E-05 |
| dibeliz(a,ri)ariiriacelie horzo(a h liner/lene | 6.659E-04 | 2.408E-07 | 8.181E-06 | 2.494E-06 | 3.711E-03 | 6.415E-08 | 9.278E-04 |
| Diovin/Furan Dafa | | | | | | 1.00 | 0.04417.40 |
| 2378-TCDD | 4.360E-10 | 8.000E-12 | 5.359E-12 | 1.634E-12 | 2.431E-09 | 4.201E-14 | 4 956E 00 |
| 12378-PECDD | 1.341E-09 | 9.000E-12 | 1.637E-11 | 4.991E-12 | 7.426E-09 | 1,264E-13 | 2 772E-09 |
| 123478-HXCDD | 1.989E-09 | 1.050E-11 | 2.445E-11 | 7.453E-12 | 3 230 1.08 | 5.584E-13 | 8.076E-09 |
| 123678-HXCDD | 5.812E-09 | 1.700E-11 | 7.122E-11 | 2.17 IE-11 | 3 077E-08 | 5.319E-13 | 7.694E-09 |
| 123789-HXCDD | 5.536E-09 | 1.550E-11 | 6.7855-11 | 4.050E-11 | 6.327E-07 | 1 094E-11 | 1.582E-07 |
| 1234678-HPCDD | 1.137E-07 | 2.495E-10 | 1.395E-09 | 4.232E-10 | 3 5085.06 | 6 219E-11 | 8.995E-07 |
| OCDD | 6.470E-07 | 1.587E-09 | 7.93ZE-09 | Z.4 10E-US | 9.030E-10 | 1 397F-14 | 2.021E-10 |
| 2378-TCDF | 1.560E-10 | 1.100E-11 | 1.782E-12 | 5,433E-13 | O'COTO | | CN |
| 12378-PECDF | 2.870E-10 | 1.050E-11 | CN | ON C | OF SEATE 10 | 1 653F-14 | 2.390E-10 |
| 23478-PECDF | 1.870E-10 | 1.550E-11 | 2.108E-12 | 6,42/E-13 | 9.301E-10 | 2 5545-14 | 5 136E-10 |
| 123478-HXCDF | 3.965E-10 | 2.800E-11 | 4.529E-12 | 1.38TE-12 | 4.034E-03 | 2.154E-14 | 3.115E-10 |
| 123678-HXCDF | 2.380E-10 | 1.450E-11 | 2./4/E-12 | 0,37.35-13 | ON ON | GN | S |
| 123789-HXCDF | 3.015E-10 | 6.000E-12 | ON | | | | |

Table B-9: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases 200 meter location

| | | | 000 / | | | | |
|--------------------------------------|----------------------------------|--|--|-------------------------------------|--------------------------|--|---|
| | | DOD! | DODIC: D540 | | No. of rounds (I) | <u>- 4</u> | 1 rounds 4 seconds |
| | N O | Net Explosive Weight (NEW) in Ibs | it (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 6.914E-05 | 6.914E-05 (q/m³)/(q/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 ak Rate Dilution Factor => | 0.939 | | | |
| | | Section of contract of the | NACOLKA DI INCON | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | | Average Adjusted Emission Factor | Average Adjusted Emission Factor | Emitted (grams/item) | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) |
| | (mg/m ₃) | (mg/m ₃) | (IDAMEILI) EF | (Ib/Ib NEW) | Σ | CONC | ER, |
| 234678-HXCDF | 2.450E-10 | 1.200E-11 | QN | ND. | QN | QN | CN |
| 1234678-HPCDF | 4,119E-09 | 7.750E-11 | 4.967E-11 | 1.514E-11 | 2.253E-08 | 3.894E-13 | 5.632E-09 |
| 1234789-HPCDF | 6.770E-10 | 8.000E-12 | 8.223E-12 | 2.507E-12 | 3.730E-09 | 6.447E-14 | 9.324E-10 |
| OCDF | 1.221E-08 | 1.105E-10 | 1.488E-10 | 4.536E-11 | 6.748E-08 | 1.166E-12 | 1.687E-08 |
| Aidehydes | | | | | | | |
| Formaldehyde | 1.228E-02 | 1.228E-02 | Q | Q | QN | S | QN |
| Acetaldehyde | 1.802E-02 | 1.802E-02 | QN | QN | QN | QN | QN |
| Acetone | 2.375E-02 | 4.751E-02 | Q | QN | QN | QN | Q |
| Acrolein | 2.294E-02 | 2.294E-02 | QN | QN | QN | QN | S |
| Proprionaldehyde | 2.374E-02 | 2.374E-02 | QN | QN | QN | S | QN |
| Crotonaldehyde | 2.867E-02 | 2.867E-02 | QN | QN | ON | QN | QN. |
| Butyraldehyde | 2.949E-02 | 2.949E-02 | QN | QN | QN | QN | QN |
| Benzaldehyde | 4.340E-02 | 4.340E-02 | Q | ON | QN | S | QN |
| Isovaleraidehyde | 3.523E-02 | 3.523E-02 | Q | QN | ON | QN | QN |
| Valeraidenyde | 3.523E-02 | 3.523E-02 | 9 | Q | QN | QN | QN |
| U,III,p-1 Oluaidenyde Hexeldehyde | 1.229E-01 | 9.828E-02 | Q S | 2 | QN | S | QN |
| 7 5-Dimethylbenzaldobyda | 4.097E-02 | 4.097E-02 | 2 2 | Q S | QN | QN | ΩN |
| Anid annon | 4.097.5-02 | 4.097E-02 | QN | a N | QN | QN | S |
| Acid gases | | | | | | | |
| Hydrogen fluoride | 1.400E-01 | 1.400E-01 | QN | 2 | ON | ON | QN. |
| Hydrogen chloride | 1.300E-01 | 1.300E-01 | QN | QN | QN | QN | QN |
| Hydrogen bromide | 1.400E-01 | 1.400E-01 | Q | QN | QN | QN | QN |
| Nitric Acid | 1.400E-01 | 1.400E-01 | Q | ON | QN | QN. | QN |
| Phosphoric acid | 1.400E-01 | 1.400E-01 | ΩN | QN | QN | QN | QN |
| Sulfuric Acid | 1.400E-01 | 1.400E-01 | QN | QN | QN | ND | QN |
| Footnotes: | \$ \$ | | | | | | |

¹ATC = Aberdeen Test Center (for addittonal information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

Table B-10: Air Modeling Output Data for Cyanide and Energetics - 200 meter location

| | 155mm | propelling charge | 155mm propelling charge M3 (zone 3), M199 cannon DODIC: D540 | 9 cannon | No. of rounds (I) release duration (I): | 4 | rounds seconds |
|-----------------------------|--|--|---|--|---|---------------------------|---|
| | Ne | Net Explosive Weigh | osive Weight (NEW) In lbs. => | 3.28 | Unit Concentration (UC): | 6.914E-05 | 6.914E-05 (g/m³)/(g/s) |
| | | Number of SF6 Leak Rate D | Number of Items = 1 Leak Rate Ollution Factor => | 0.939 | | | |
| | Name of the Control o | antification of | ग्रहीन्त्रीतक प्रस्तेतास्त जातः हो | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (lb/item) EF | Average Adjusted Emission Factor (ib/ib NEW) | Emitted (grams/ltem) M | One Round (grams/m³) CONC | Crinssion Rade for One Round (g/sec) ER, |
| Particulate Cyanide and HCN | | | | | | | |
| Particulate Cyanide | 8.000E-02 | 8.000E-02 | QN | QN | QN | QN | QN |
| Hydrogen Cyanide | 9.500E-01 | 8.500E-02 | 1.168E-02 | 3.560E-03 | 5.296E+00 | 9.155E-05 | 1.324E+00 |
| Energetics Data | | | | | | | |
| Nitrobenzene | 5.021E-01 | 2.031E-01 | Q | Q. | QN | QN | QN |
| 2-Nifrotoluene | 5.021E-01 | 2.031E-01 | QN | Q | QN | Q | ΩN |
| 3-Nitrotoluene | 5.021E-01 | 2.031E-01 | ΩN | Q | ND | QN | S |
| 4-Nitrotoluene | 5.021E-01 | 2.031E-01 | QN | ON | QN | ND | S |
| Nitroglycerine | 5.021E-01 | 2.031E-01 | ND | ON. | ND | QN | Q |
| 1,3-Dinitrobenzene | 5.021E-01 | 2.031E-01 | QN | QN | QN | QN | QN |
| 2,6-Dinitrotoluene | 5.021E-01 | 2.031E-01 | QN | QN | QN | QN | NO ON |
| 2,4-Dinitrotoluene | 5.021E-01 | 2.031E-01 | QN | QN | QN · | S | QN |
| 1,3,5-Trinitrobenzene | 5.021E-01 | 2.031E-01 | QN | QN | ND | QN | QN |
| 2,4,6-Trinitrotoluene | 5.021E-01 | 2.031E-01 | QN | 9 | Q | Q | ΩΩ |
| RDX | 5.021E-01 | 2.031E-01 | ND | 9 | ND | Q | QQ |
| 4-Amino-2,6-Dinitrotoluene | 5.021E-01 | 2.031E-01 | SD | QN | QN | Q | SD |
| 2-Amino-4,6-Dinitrotoluene | 5.021E-01 | 2.031E-01 | ND | QN | QN | QN | QN |
| Tetryl | 5.021E-01 | 2.031E-01 | QN | ΩN | ON | QN | QN |
| HMX | 1.004E+00 | 4.062E-01 | ND | QN | ND | QN | ON |
| Pentaerythritoltetranitrate | 1.004E+00 | 4.062E-01 | ND | ON | ND | QN | QN |
| Dibutyl phthalate | 2.510E+01 | 1.016E+01 | QN | ND | ND | QN | QN |
| Dioctyl phthalate | 2.510E+01 | 1,016E+01 | ND | 2 | QN | Q | Q |
| Diphenylamine | 1.255E+01 | 5.078E+00 | ND | Q | ND | Q | ND |
| Footnotes: | | | | | | | |

¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

AIR MODELING OUTPUT DATA FOR CHARGE M3, FIRED FROM THE M284 CANNON, ZONE 3, 100 METERS DOWNWIND

Table B-11: Air Modeling Output Data for Gases, Metals, and Particulates - 100 meter location

| | 155mm | propelling charge | 155mm propelling charge M3 (zone 3). M284 cappon | 4 cannon | No of rounds (I) | | spuilos |
|----------------------|---|--|--|--|------------------------------|--|--|
| | | Idod | DODIC: D540 | | release duration (t): | · ম | seconds |
| | eN. | Net Explosive Welgh | losive Weight (NEW) in ibs. => | 3.28 | Unit Concentration (UC): | 1.608€-04 | 1.608E-04 (g/m³)/(g/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 ak Rate Dilution Factor => | 0.896 | | | |
| | | AND PROPERTY. | Medalline Authornomics | Harry Land College Col | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (lb/ltem) EF | Average Adjusted Emission Factor (lb/lb NEW) | Emitted (grams/item) M | Concentration for One Round (grams/m³) CONC | Emission Rate for One Round (g/sec) ER ₁ . |
| Gases | | | | | | | |
| NH3 | 3.780E+00 | ĄN | 4.363E-02 | 1.330E-02 | 1.979E+01 | 1.591E-03 | 9.894E+00 |
| CO2 | 6.480E+01 | NA | 7.479E-01 | 2.280E-01 | 3.392E+02 | 2.727E-02 | 1.696E+02 |
| CO | 1.679E+02 | NA | 1.938E+00 | 5.908E-01 | 8.790E+02 | 7,067E-02 | 4.395E+02 |
| NOx (as NO) | 1.353E+00 | NA | 1.562E-02 | 4.761E-03 | 7.083E+00 | 5,695E-04 | 3.541E+00 |
| CH4 | 2.178E+00 | NA | QN | QN | QN | S | QN |
| SO2 | 5.240E-01 | NA | QN | QN | ND | QN | QN |
| Combined Particulate | | | | | | | |
| TSP | 4.514E+00 | 5.300E-02 | 5.746E-02 | 1.752E-02 | 2.606E+01 | 2.096E-03 | 1.303E+01 |
| PM10 | 3.875E+00 | 4.233E-02 | 4.937E-02 | 1.505E-02 | 2.239E+01 | 1.800E-03 | 1.120E+01 |
| PM2.5 | 2.074E+00 | 2.400E-02 | 2.641E-02 | 8.050E-03 | 1.198E+01 | 9.630E-04 | 5,989E+00 |
| Metals | | | | | | | |
| Antimony | 1.819E-04 | 4.345E-06 | ND | QN | QN | QN | Q |
| Arsenic | 2.814E-04 | 3.091E-06 | 3.585E-06 | 1.093E-06 | 1.626E-03 | 1.308E-07 | 8.131E-04 |
| Barlum | 2.814E-03 | 3.255E-05 | 3.583E-05 | 1.092E-05 | 1.625E-02 | 1.307E-06 | 8.126E-03 |
| Beryllium | 7.796E-05 | 1.649E-06 | QN | ΩN | QN | QN | QN |
| Cadmlum | 7.796E-05 | 1.649E-06 | QN | QN | QN | GN | QN |
| Chromlum | 4.978E-04 | 7.167E-06 | 6.320E-06 | 1.927E-06 | 2.867E-03 | 2.305E-07 | 1.433E-03 |
| Cobalt | 8.659E-05 | 3.763E-06 | 1.067E-06 | 3.253E-07 | 4.839E-04 | 3.891E-08 | 2.420E-04 |
| Copper | 2.598E-01 | 1.159E-03 | 3.331E-03 | 1.016E-03 | 1.511E+00 | 1,215E-04 | 7.555E-01 |
| Lead | 2.381E-02 | 6.770E-05 | 3.059E-04 | 9.325E-05 | 1.387E-01 | 1,115E-05 | 6.937E-02 |
| Manganese | 1.992E-03 | 3.086E-05 | 2.526E-05 | 7.700E-06 | 1.146E-02 | 9.211E-07 | 5.728E-03 |
| Nickel | 8.659E-04 | 1.433E-05 | 1.097E-05 | 3.344E-06 | 4.975E-03 | 4.000E-07 | 2,488E-03 |
| Selenium | 2.599E-04 | 5.497E-06 | S | Q | ND | QN | QN |
| Silver | 5.197E-05 | 1.099E-06 | ND | ON | QN | QN | QN |
| Thallium | 7.796E-05 | 1.613E-06 | QN | ON | QN | GN | QN |
| Zinc | 4.544E-02 | 1.445E-04 | 5.835E-04 | 1.779E-04 | 2.647E-01 | 2.128E-05 | 1.323E-01 |
| Footnotes: | | | | | | | |

M3series_air_print.xls

¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

Table B-12: Air Modeling Output Data for Volatile Organic Compounds - 100 meter location

| Compound omethane e uoroethane | Measured Actual Concentration (mg/m³) (mg/m³) (mg/m³) 1.594E-03 1.594E-03 | DODIC: D540 losive Weight (NEW) in lbs. Number of Items = 1 | D540 JEW) in lbs. => | 3.28 | release duration (t): | 2 1 608E-04 | seconds |
|---|---|---|--|--|-----------------------------|--|--|
| Compound codifluoromethane Chloride cotetrafluoroethane | SFC SFC Co | e Weight (N | | 3.28 | I full Concentration (LIC) | 1 RORE-04 | 1 |
| Compound rodifluoromethane Chloride rotetrafluoroethane | SF6 B CO | Number of It | tomo II 4 | 2 | | 1,0001 | 1.505E-04 (g/m²)/(g/s) |
| Compound rodifluoromethane Chloride | Z m O | Leak Rate Dilution Factor | Ilon Factor | 0.896 | | | |
| Compound rodifluoromethane Chloride | | | हें हैं। जिल्हा है जिल्हा जिल्हा | | Total Mass of Substance | Average Modeled | Substance |
| rodifluoromethane Chloride rotetrafluoroethane | | _ | Average Adjusted Emission Factor (Ib/Item) | Average Adjusted Emission Factor (Ib/Ib NEW) | Emited (grams/ltem) M | Concentration for One Round (grams/m³) | Emission Kate for One Round (g/sec) ER ₁ |
| rodifluoromethane Chloride rotetrafluoroethane | 69/- | \vdash | | | | | |
| | | .762E-03 | Q | Q | ON | QN | S |
| | | .594E-03 | QN | QN | QN | QN | QN |
| | 4 | .683E-03 | ON | QN | ON | ND | QN |
| Vinyi Chloride 5.068 | 5.069E-03 5.069 | .069E-03 | ND | QN | ON | QN | Q |
| | - | .790E-03 | QN | QN | QN | QN | QN |
| Methyl Bromide 3.073 | 3 | .073E-03 | QN | QN | ND | Q | QN |
| Ethyl Chloride 2.112 | | .112E-03 | Q | QN | ND | QN | QN |
| Trichlorofluoromethane 3.934 | | E-03 | QN | ON | ND | ND | Q |
| 1,1-Dichloroethene 9.339 | 9 | 3.696E-03 | 3.405E-05 | 1.038E-05 | 1.544E-02 | 1.242E-06 | 7.722E-03 |
| Dichloromethane 2.436 | 2,436E-01 5.722 | .722E-03 | 3.064E-03 | 9.341E-04 | 1.390E+00 | 1.117E-04 | 6.948E-01 |
| 3-Chloropropene 2.754 | 2.754E-03 2.754 | .754E-03 | QN | QN | ND | QN | QN |
| 2,2-trifluoroethane | 5.148E-03 5.750 | .750E-03 | QN | QN | ND | QN | QN |
| 1,1-Dichloroethane 3.159 | 3 | .159E-03 | QN | QN | QN | QN | ΩN |
| cis-1,2-Dichloroethene 3.295 | 3.295E-03 3.295 | .295E-03 | ON | QN | QN | ON | QN |
| Trichloromethane 4.099 | 4 | .099E-03 | QN | QN | QN | ON | QΝ |
| 1,2-Dichloroethane 3.443 | 3.443E-03 3.443 | .443E-03 | QN | QN | QN | ON | QN |
| 1,1,1-Trichloroethane 7.867 | 7.867E-02 1.095 | .095E-01 | QN | 9 | QN | QN | Q |
| Benzene 4.807 | 2 | .329E-03 | 6.192E-04 | 1.888E-04 | 2.808E-01 | 2.258E-05 | 1.404E-01 |
| Carbon Tetrachloride 4.529 | 4.529E-03 4.529 | .529E-03 | QN | QN | QN | ON | QN |
| 1,2-Dichloropropane 3.419 | 3.419E-03 3.419 | .419E-03 | QN | QN | GN | QN | GN |
| Trichloroethene 3.866 | 3 | .866E-03 | QN | QN | QN | QN | ΩN |
| cis-1,3-Dichloropropene 3.360 | 3 | .360E-03 | ON | QN | ON | ND | QN |
| trans-1,3-Dichloropropene 2.860 | 2 | .860E-03 | . QN | UD | GN | ND | QN |
| 1,1,2-Trichloroethane 3.877 | 3.877E-03 3.877 | .877E-03 | QN | QN | QN | QN | QN |
| Toluene 4.247 | | .610E-03 | 8.207E-06 | 2.502E-06 | 3.723E-03 | 2.993E-07 | 1,861E-03 |
| 1,2-Dibromoethane 5.844 | | 5.844E-03 | Q | Q. | ND | QN | QN |
| Tetrachloroethene 4.475 | 4.475E-03 4.475 | E-03 | Ω | 2 | QN | QN | 2 |

Table B-12: Air Modeling Output Data for Volatile Organic Compounds - 100 meter location

| | 155mm pro | oropelling charge DODI | pelling charge M3 (zone 3), M284 cannon DODIC: D540 | 4 cannon | No. of rounds (I) release duration (t): | 2 | 1 rounds 2 seconds |
|---------------------------|--------------------------|--|--|--------------------------------|---|-----------------------------|--------------------------------|
| | Ne | Net Explosive Weight (NEW) in Ibs. | t (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 1.608E-04 | 1.608E-04 (g/m³)/(g/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 sk Rate Dllution Factor => | 968:0 | | | |
| | | Hilly or confoliable for the | 7. | A CONTRACTOR | Total Mass of Substance | Average Modefed | Substance |
| Compound | Measured Actual | Measured | Average Adjusted Emission Eactor | Average Adjusted | Emitted (grams/item) | Concentration for One Round | Emission Rate for One Round |
| | Concentration (mg/m³) | Concentration (mg/m³) | (lb/ltem) EF | Emission Factor (Ib/Ib NEW) | W | (grams/m²) CONC | (g/sec) ER ₁ |
| Chlorobenzene | 2.305E-04 | 2.305E-04 | GN | QN | QN | QN | QN |
| Ethylbenzene | 2.344E-03 | 2.344E-03 | QN | QN | QN | S | Q |
| m&p-Xylene | 2.257E-03 | 2.257E-03 | QN | QN | QN | QN | QN |
| Styrene | 2.641E-03 | 2.641E-03 | ON | QN | ON | QN | QN |
| 1,1,2,2-Tetrachloroethane | 4.466E-03 | 4.466E-03 | QN | QN | DN | ΩN | QV |
| o-Xylene | 2.474E-03 | 2.474E-03 | QN | QN | ON | QN | QN. |
| 4-Ethyltoluene | 2.214E-03 | 2.214E-03 | QN | GN | DN | QN | QN |
| 1,3,5-Trimethylbenzene | 2.460E-03 | 2.460E-03 | QN | QN | QN | QN | QN |
| 1,2,4-Trimethylbenzene | 2.312E-03 | 2,312E-03 | 2 | QN | ON | ND | QN |
| Benzyl Chloride | 5.076E-03 | 5.076E-03 | Q | 2 | ND | QN | QN |
| m-Dichlorobenzene | 3,366E-03 | 3.366E-03 | ΩN | QN | QN | QN | QN |
| p-Dichlorobenzene | 2.945E-03 | 2.945E-03 | QN | QN | QN | QN | Q |
| o-Dichtorobenzene | 3.606E-03 | 3.606E-03 | S | Q | ON | ND | QN |
| 1,2,4-Trichlorobenzene | 4.526E-03 | 4.526E-03 | Q | ΩN | ND | ND | QN |
| Hexachlorobutadiene | 4.690E-03 | 4.690E-03 | Q | QN | ON | ND | QN |
| Methane | 2.023E+00 | 1.364E+00 | 8.488E-03 | 2.588E-03 | 3.850E+00 | 3.095E-04 | 1.925E+00 |
| Ethane | 6.764E-01 | 6.764E-01 | Q | QN | ON | QN | QN |
| Ethylene | 6.310E-01 | 6.310E-01 | QN | QN | ON | ND | QN |
| Propane | 9.920E-01 | 9.920E-01 | QN | ON | ND | QN | S |
| Acetylene | 5.858E-01 | 5.858E-01 | ND | ON | QN | Q | Q |
| Isobutane | 1.307E+00 | 1.307E+00 | ND | QN | ON | QN | Q |
| n-Butane | 1,307E+00 | 1.307E+00 | QN | QN | ON | QN | 2 |
| Propylene | 9.466E-01 | 9.466E-01 | QN | ON | QN | QN | S |
| Contractor | | | | | | | |

Footnotes:

'ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study)
ND = Not Detected

Table B-13: Air Modeling Output Data for Semi-Volatile Organic Compounds - 100 meter location

| | 155mm | propelling charge | 155mm propelling charge M3 (zone 3), M284 cannon | t cannon | No. of rounds (I) | 1 | rounds |
|-----------------------------|---|--|--|--|------------------------------|--|--|
| | | מסם | DODIC: D540 | | release duration (t): | 2 | seconds |
| | N _O | Net Explosive Weigh | osive Weight (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 1.608E-04 | 1.608E-04 (g/m³)/(g/s) |
| | | | Number of Items = 1 | | | | |
| | | SF6 Leak Rate D | Leak Rate Dllution Factor => | 0.896 | | | |
| | | | Sectional Creation | 10 mm | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (lb/item) EF | Average Adjusted Emission Factor (Ib/Ib NEW) | Emitted (grams/item) M | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) ER, |
| SVOCs | | | | | | | |
| n-nitrosodimethylamine | 2.572E-03 | 2.236E-03 | QN | QN | ND | QN | QN |
| bis(2-chloroethyl)ether | 2.572E-03 | 2.236E-03 | QN | QN | QN | ND | QN |
| phenol | 2.058E-02 | 1.923E-02 | 1.743E-05 | 5.314E-06 | 7.906E-03 | 6.357E-07 | 3.953E-03 |
| 2-chlorophenol | 2.572E-03 | 2.236E-03 | QN | QN | ON | QN | QN |
| 1,3-dichlorobenzene | 2.572E-03 | 2.236E-03 | Q | QN | ND | ND | QN |
| 1,4-dichlorobenzene | 2.572E-03 | 2.236E-03 | QN | ON | ND | ND | ON |
| 1,2-dichlorobenzene | 2.572E-03 | 2.236E-03 | GN | QN | ND | ND | QN |
| benzyl alcohol | 2.572E-03 | 2.236E-03 | QN | QN | ND | ND | ND |
| bis(2-chlorolsopropyl)ether | 2.572E-03 | 2.236E-03 | QN | ON | ON | ND | QN |
| 2-methylphenol | 2.572E-03 | 2.236E-03 | ON | Q | ND | ND | ON |
| hexachloroethane | 2.572E-03 | 2.236E-03 | QN | QN | ND | ND | QN |
| n-nitroso-di-n-propylamine | 2.572E-03 | 2.236E-03 | QN | QN | QN | QN | QN |
| 4-methylphenol | 2.572E-03 | 2.236E-03 | GN | ON | QN | QN | QN. |
| nitrobenzene | 2.572E-03 | 2.236E-03 | QN | ON | QN | QN | QN |
| isophorone | 2.572E-03 | 2.236E-03 | QN | QN | ON | ND | QN |
| 2-nitrophenol | 2.572E-03 | 2.236E-03 | QN | 9 | ON | ND ND | QN |
| 2,4-dimethylphenol | 2.572E-03 | 2.236E-03 | Q | 2 | ON | ND | QN |
| bis(2-chloroethoxy)methane | 2.572E-03 | 2.236E-03 | QN | Q | ΩN | S | QN |
| 2,4-dichlorophenol | 2.572E-03 | 2,236E-03 | ND | ΩN | ND | ND | QN |
| 1,2,4-trichlorobenzene | 2.572E-03 | 2.236E-03 | QN | QN | ND | ND | QN |
| naphthalene | 3.659E-03 | 2.236E-03 | 4.713E-05 | 1,437E-05 | 2.138E-02 | 1.719E-06 | 1.069E-02 |
| 4-chloroaniline | 2.572E-02 | 2.236E-02 | QN | QN | QN | ND | QN |
| hexachtorobutadiene | 2.572E-03 | 2.236E-03 | QN | QN | ND | QN | QN |
| 4-chloro-3-methylphenol | 2.572E-03 | 2.236E-03 | QN | QN | ND | ND | QN |
| 2-methylnaphthalene | 2.572E-03 | 2.236E-03 | QN | QN | ON | ND | QN |
| hexachlorocyclopentadlene | 2.572E-03 | 2,236E-03 | QN | QN | ON | ND | QN |
| 2,4,6-trichlorophenol | 2.572E-03 | 2.236E-03 | 9 | QN | ON | QV | Q |

Table B-13: Air Modeling Output Data for Semi-Volatile Organic Compounds - 100 meter location

| | 155mm p | propelling charge | 155mm propelling charge M3 (zone 3), M284 cannon | t cannon | No. of rounds (I) | + | rounds |
|----------------------------|----------------------------------|--|--|-------------------------------------|--------------------------|--|---|
| | | DODI | DODIC: D540 | | release duration (t): | 2 | seconds |
| | eN | Net Explosive Weight (NEW) in Ibs. | t (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 1.608E-04 | 1.608E-04 (g/m³)/(g/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 sk Rate Dilution Factor => | 0.896 | | | |
| | | PHYSICAL SHEARING SENTENCES | | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background | Average Adjusted Emission Factor | Average Adjusted Emission Factor | Emitted (grams/item) | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) |
| | (mg/m³) | concentration (mg/m³) | (ID/item) EF | (Ib/Ib NEW) | Σ | CONC | ER, |
| 2,4,5-trichlorophenol | 2.572E-03 | 2.236E-03 | QN | QN | QN | QN | QN |
| 2-chloronaphthalene | 2.572E-03 | 2.236E-03 | QN | QN | ND | Q | S |
| 2-nitroaniline | 2.572E-03 | 2.236E-03 | QN | QN | QN | QN | QN |
| dimethyiphthalate | 2.572E-03 | 2.236E-03 | QN | QN | QN | QN | QN |
| 2,6-dinitrotoluene | 2.572E-03 | 2.236E-03 | QN | ON | ND | ON | QN |
| 3-nitroaniline | 5.144E-03 | 4.471E-03 | QN | QN | QN | ON | QN |
| 2,4-dinitrophenol | 5.144E-03 | 4.471E-03 | ON | ON | QN | ON | QN |
| dibenzofuran | 2.572E-03 | 2.236E-03 | QN | QN | GN | ND | QN |
| 2,4-dinitrotoluene | 2.572E-03 | 2.236E-03 | QN | QN | QN | QN | QN |
| 4-nitrophenol | 5.144E-03 | 4.471E-03 | QN | QN | QN | QN | QN |
| 4-chlorophenyl-phenylether | 2.572E-03 | 2.236E-03 | QN | QN | ND | QN | QN |
| diethylphthalate | 2.572E-03 | 2.236E-03 | ON | ΩN | QN | QN | QN |
| 4-nitroaniline | 5.144E-03 | 4.471E-03 | QN | QN | QN | ND | QN |
| 4,6-dinitro-2-methylphenol | 5.144E-03 | 4.471E-03 | Q | QN | QN | QN | QN |
| n-nitrosodiphenylamine(1) | 2.572E-03 | 2.236E-03 | QN | QN | QN | SN. | ND |
| 4-bromophenyl-phenylether | 2.572E-03 | 2.236E-03 | Q | ND | QN | ON | ND |
| hexachlorobenzene | 2.572E-03 | 2.236E-03 | ON | QN | QN | ON | QN |
| pentachlorophenol | 5.144E-03 | 4.471E-03 | QN | QN | QN | QN | Q |
| di-n-butylphthalate | 2.572E-03 | 2.236E-03 | QN | QN | QN | ON | QN |
| butylbenzylphthalate | 2.572E-03 | 2.236E-03 | QN | QN | QN | QN | QN |
| bis(2-ethylhexyl)phthalate | 1.269E-01 | 5.813E-02 | 8.853E-04 | 2.699E-04 | 4.015E-01 | 3.228E-05 | 2.008E-01 |
| di-n-octylphthalate | 2.572E-03 | 2.236E-03 | ND | ND | ND | ON | QN |
| Footnotes: | | | | | | | |

¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

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Table B-14: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases 100 meter location

| | | | *************************************** | | | | |
|------------------------|------------------|----------------------|--|-------------------------------------|--------------------------|-----------------------------|--------------------------------|
| | 155mm | propelling charge | 155mm propelling charge M3 (zone 3), M284 cannon | 4 cannon | No. of rounds (I) | ← 7 | rounds |
| | | DOD | DODIC: D540 | | release duration (t): | N ⁻ | seconds |
| | Ne | Net Explosive Weigh | losive Weight (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 1.608E-04 | 1.608E-04 (g/m³)/(g/s) |
| | | Number | | | | | |
| | | | Leak Rate Dilution Factor => | 0.896 | | | |
| | | anguesales | Secondal Merchanter and Secondary | | Total Mass of Substance | Average Modeled | Substance |
| | Adamate A police | Measured | Average Adjusted | 1 V | Emitted (grams/item) | Concentration for One Round | Emission Rate for One Round |
| Compound | Concentration | Background | Emission Factor | Average Adjusted Emission Factor | | (grams/m³) | (a/sec) |
| | (mg/m³) | (mg/m ₃) | EF | (Ib/Ib NEW) | M | CONC | ER, |
| PAHs (TO-13 Method) | | | | • | | | |
| acenaphthylene | 5.945E-04 | 6.260E-06 | 7.578E-06 | 2.310E-06 | 3.437E-03 | 2.763E-07 | 1.719E-03 |
| acenaphthene | 2.275E-04 | 9.166E-05 | 1,750E-06 | 5.334E-07 | 7.936E-04 | 6.381E-08 | 3.968E-04 |
| fluorene | 2.944E-04 | 8.495E-05 | 2.698E-06 | 8.224E-07 | 1.224E-03 | 9.838E-08 | 6.118E-04 |
| phenanthrene | 5.287E-04 | 1.453E-04 | 4.938E-06 | 1,506E-06 | 2.240E-03 | 1.801E-07 | 1.120E-03 |
| anthracene | 6.603E-05 | 6.707E-06 | 7.641E-07 | 2.330E-07 | 3,466E-04 | 2.787E-08 | 1.733E-04 |
| fluoranthene | 2.244E-04 | 2.459E-05 | 2,573E-06 | 7.845E-07 | 1.167E-03 | 9.384E-08 | 5,836E-04 |
| pyrene | 5.831E-04 | 2.191E-05 | 7.229E-06 | 2.204E-06 | 3,279E-03 | 2.636E-07 | 1.639E-03 |
| benzo(a)anthracene | 3.944E-05 | 2.236E-06 | 5.081E-07 | 1.549E-07 | 2.305E-04 | 1.853E-08 | 1.152E-04 |
| chrysene | 3.830E-05 | 2.236E-06 | 4.933E-07 | 1.504E-07 | 2.238E-04 | 1.799E-08 | 1.119E-04 |
| benzo(b)fluoranthene | 8.890E-05 | 3.353E-06 | 1.102E-06 | 3.360E-07 | 4.998E-04 | 4.019E-08 | 2.499E-04 |
| benzo(k)fluoranthene | 7.431E-05 | 2.459E-06 | 9.255E-07 | 2.822E-07 | 4,198E-04 | 3,375E-08 | 2.099E-04 |
| benzo(a)pyrene | 1.409E-04 | 2.906E-06 | 1.778E-06 | 5.420E-07 | 8.063E-04 | 6.483E-08 | 4.032E-04 |
| Indeno(1,2,3-cd)pyrene | 2.218E-04 | 7.601E-06 | 2.759E-06 | 8.412E-07 | 1.252E-03 | 1.006E-07 | 6.258E-04 |
| dlbenz(a,h)anthracene | 8.432E-06 | 3.130E-06 | 6.829E-08 | 2.082E-08 | 3.098E-05 | 2.490E-09 | 1.549E-05 |
| benzo(g,h,i)perylene | 5.202E-04 | 1,185E-05 | 6.548E-06 | 1.996E-06 | 2.970E-03 | 2.388E-07 | 1,485E-03 |
| Dioxin/Furan Data | | | | | | | |
| 2378-TCDD | 7.755E-10 | 8.000E-12 | 9.989E-12 | 3.045E-12 | 4.531E-09 | 3.643E-13 | 2.265E-09 |
| 12378-PECDD | 2.710E-10 | 9.000E-12 | 2 | Q | QN | QN | QN |
| 123478-HXCDD | 4.990E-10 | 1.050E-11 | Q | <u>Q</u> | QN | Q. | Q |
| 123678-HXCDD | 6.330E-10 | 1.700E-11 | 7.935E-12 | 2.419E-12 | 3.599E-09 | 2.894E-13 | 1.800E-09 |
| 123789-HXCDD | 2.635E-10 | 1.550E-11 | 3.194E-12 | 9.739E-13 | 1.449E-09 | 1.165E-13 | 7.245E-10 |
| 1234678-HPCDD | 5.851E-09 | 2.495E-10 | 7.215E-11 | 2.200E-11 | 3.272E-08 | 2.631E-12 | 1.636E-08 |
| OCDD | 4.574E-08 | 1.587E-09 | 5.687E-10 | 1.734E-10 | 2.580E-07 | 2.074E-11 | 1.290E-07 |
| 2378-TCDF | 5.110E-10 | 1.100E-11 | 6.440E-12 | 1.964E-12 | 2.921E-09 | 2.349E-13 | 1.461E-09 |
| 12378-PECDF | 2.975E-10 | 1.050E-11 | Q | Q | QN | QD | ON |
| 23478-PECDF | 2.480E-10 | 1.550E-11 | 2.995E-12 | 9.130E-13 | 1.358E-09 | 1.092E-13 | 6.792E-10 |
| 123478-HXCDF | 4.410E-10 | 2.800E-11 | 5.320E-12 | 1.622E-12 | 2.413E-09 | 1.940E-13 | 1.206E-09 |
| 123678-HXCDF | 2.270E-10 | 1.450E-11 | 2.737E-12 | 8.345E-13 | 1.242E-09 | 9.982E-14 | 6.208E-10 |
| 123789-HXCDF | 2.895E-10 | 6.000E-12 | Q | Q. | QN | 9 | S |
| | | | | | | | |

Table B-14: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases 100 meter location

| | | | | الاستالات المستالات | | | |
|--------------------------|----------------------------|--|---|---|--------------------------|----------------------|------------------------|
| | 155mm pro | propelling charge | ppelling charge M3 (zone 3), M284 cannon | 4 cannon | No. of rounds (!) | ~ | 1 rounds |
| | | Idod | DODIC: D540 | | release duration (t): | 2 | 2 seconds |
| | θN | Net Explosive Weight (NEW) in Ibs. | t (NEW) in ibs. => | 3.28 | Unit Concentration (UC): | 1,608E-04 | 1.608E-04 (g/m³)/(g/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 sk Rate Dilution Factor => | 0.896 | | | |
| | | Georgical Inflict | | | Total Mass of Substance | Average Modeled | Substance |
| | No tractical states of the | " | | S COLUMN TO THE STREET | Emitted | Concentration for | Emission Rate for |
| Compound | Measured Actual | Measured Background | Average Adjusted Emission Factor | Average Adjusted | (grams/ltem) | One Round (grams/m³) | One Round (a/sec) |
| | (mg/m³) | Concentration (mg/m³) | (lb/ltem) EF | (Ib/Ib NEW) | Σ | CONC | ER, |
| 234678-HXCDF | 2.395E-10 | 1,200E-11 | ΩN | ND. | QN | Q | QN |
| 1234678-HPCDF | 1.954E-09 | 7.750E-11 | 2.416E-11 | 7.367E-12 | 1.096E-08 | 8.812E-13 | 5.480E-09 |
| 1234789-HPCDF | 2.900E-10 | 8.000E-12 | QN | QN | QN | Q | QN |
| ocdf | 2.410E-09 | 1,105E-10 | 2.962E-11 | 9.030E-12 | 1,344E-08 | 1.080E-12 | 6.718E-09 |
| Aldehydes | | | | | | | |
| Formaldehyde | 1.228E-02 | 1.228E-02 | Q | QV | ON | ND | QN |
| Acetaldehyde | 1.802E-02 | 1.802E-02 | 2 | 2 | ND | ND | QN |
| Acetone | 3.563E-02 | 4.751E-02 | ON | QN | ND | QN | QN |
| Acrolein | 2.294E-02 | 2.294E-02 | ON | QN | ON | QN | QN |
| Proprionaldehyde | 2.374E-02 | 2.374E-02 | QN | QN | QN | Q | QN |
| Crotonaldehyde | 2.867E-02 | 2.867E-02 | QN | QN | QN . | ON. | QN |
| Butyraldehyde | 2.949E-02 | 2.949E-02 | QN | QN | QN | <u>Q</u> | 2 |
| Benzaldehyde | 4.340E-02 | 4.340E-02 | QN | QN | QN | 2 | QN |
| Isovaleraldehyde | 3.523E-02 | 3.523E-02 | QN | QN | QN | QN | <u>Q</u> |
| Valeraldehyde | 3.523E-02 | 3.523E-02 | QN | QN | ND | QN | 9 |
| o,m,p-Tolualdehyde | 9.828E-02 | 9,828E-02 | QN | QN | UD | ND | QN |
| Hexaldehyde | 4.097E-02 | 4.097E-02 | QN | QN | ON | ND | QN |
| 2,5-Dimethylbenzaldehyde | 4.097E-02 | 4.097E-02 | S | QN | QN | ND | ON |
| Acid gases | | | | | | | |
| Hydrogen fluoride | 1.400E-01 | 1.400E-01 | ΩN | QN | QN | QN | QN. |
| Hydrogen chloride | 1.300E-01 | 1.300E-01 | ON | ON | QN | ON | 9 |
| Hydrogen bromide | 1.400E-01 | 1.400E-01 | ND | QN | QN | ON | QN |
| Nitric Acid | 2.050E-01 | 2.200E-01 | QN | QN | QN | ON | QN |
| Phosphoric acid | 1.400E-01 | 1.400E-01 | QN | Q. | ON | ON | ON |
| Sulfuric Acid | 2.150E-01 | 1.400E-01 | 2.769E-03 | 8.443E-04 | 1.256E+00 | 1.010E-04 | 6.281E-01 |
| Footnotes. | | | | | | | |

Footnotes: 'ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study)
ND = Not Detected

Table B-15: Air Modeling Output Data for Cyanide and Energetics - 100 meter location

| | 155mm prop | oropelling charge DODI | elling charge M3 (zone 3), M284 cannon DODIC: D540 | 4 cannon | No. of rounds (!) release duration (t): | 1 2 | rounds |
|-----------------------------|----------------------------------|---|---|-------------------------------------|---|-------------------------|------------------------|
| | Ne | Net Explosive Weigh | osive Weight (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 1.608E-04 | 1.608E-04 (g/m³)/(g/s) |
| | | Number of SF6 Leak Rate D | Number of Items = 1 Leak Rate Dilution Factor => | 0.896 | | | |
| | | Selfation. | Velation rastigation. | South Marie Co. | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background Concentration | Average Adjusted Emission Factor (th/item) | Average Adjusted Emission Factor | (grams/item) | One Round (grams/m³) | One Round (g/sec) |
| | (mg/m³) | (mg/m³) | EF. | (lb/lb NEW) | M | CONC | ER, |
| Particulate Cyanide and HCN | | | | • | | | |
| Particulate Cyanide | 8.000E-02 | 8.000E-02 | QN | QN | QN | QN | ON |
| Hydrogen Cyanide | 1.350E+00 | 8.500E-02 | 1.739E-02 | 5.302E-03 | 7.888E+00 | 6.342E-04 | 3.944E+00 |
| Energetics Data | | | | | | | |
| Nitrobenzene | 4.704E-01 | 2.031E-01 | 2 | Q | QN | 2 | Q |
| 2-Nitrotoluene | 4.704E-01 | 2.031E-01 | Q | Q | QN | Q. | Q |
| 3-Nitrotoluene | 4.704E-01 | 2.031E-01 | 2 | Q | QN | Q | Q |
| 4-Nitrotoluene | 4.704E-01 | 2.031E-01 | QΝ | 2 | QN | 2 | S |
| Nitroglycerine | 4.704E-01 | 2.031E-01 | QN | DD | ND | ΩN | ND |
| 1,3-Dinitrobenzene | 4.704E-01 | 2.031E-01 | QN | QN | ND | ON | S |
| 2,6-Dinitrotoluene | 4.704E-01 | 2.031E-01 | ON | QN | ND | QN | QN |
| 2,4-Dinitrotoluene | 4.704E-01 | 2.031E-01 | QN | QN | DN | Q | Q |
| 1,3,5-Trinitrobenzene | 4.704E-01 | 2.031E-01 | ON | QN | QN | 2 | Q |
| 2,4,6-Trinitrotoluene | 4.704E-01 | 2.031E-01 | 2 | Q | QN | 2 | QQ |
| RDX | 4.704E-01 | 2.031E-01 | QN | QN | QN | ON. | Q |
| 4-Amino-2,6-Dinitrotoluene | 4.704E-01 | 2.031E-01 | QN | <u>Q</u> | ND | 2 | S |
| 2-Amino-4,6-Dinitrotoluene | 4.704E-01 | 2.031E-01 | QN | ND | ND | Q | 2 |
| Tetryl | 4.704E-01 | 2.031E-01 | QN | QN | QN | ON | ND |
| HMX | 9.408E-01 | 4.062E-01 | QN | QN | ND | ON | ND |
| Pentaerythritoltetranitrate | 9.408E-01 | 4.062E-01 | QN | QN | ON | ON | QN |
| Dibutyl phthalate | 2.352E+01 | 1.016E+01 | QN | QN | QN | QN | ND |
| Dioctyl phthalate | 2,352E+01 | 1.016E+01 | ON | QN | ND | ON | ND |
| Diphenylamine | 1.176E+01 | 5.078E+00 | QN | QN | ND | QN | ND |
| Footnotes: | , | | | | | | |

'ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study)
ND = Not Detected

AIR MODELING OUTPUT DATA FOR CHARGE M3, FIRED FROM THE M284 CANNON, ZONE 3, 200 METERS DOWNWIND

Table B-16: Air Modeling Output Data for Gases, Metals, and Particulates - 200 meter location

| | 155mm p | propelling charge | 155mm propelling charge M3 (zone 3), M284 cannon | t cannon | No. of rounds (I) | | rounds |
|----------------------|---|--|--|--|------------------------------|--|--|
| | | Idod | DODIC: D540 | | release duration (t): | 4 | seconds |
| | ΘN | Net Explosive Weigh | losive Weight (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 6.914E-05 | 6.914E-05 (g/m³)/(g/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | | 0.896 | | | |
| | | Silver Callenger | See Malling Sections (1900) | The second second | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (Ib/Item) EF | Average Adjusted Emission Factor (Ib/Ib NEW) | Emitted (grams/item) M | Concentration for One Round (grams/m³) CONC | Emission Rate for One Round (g/sec) ER ₁ |
| Gases | | | | | | | |
| NH3 | 3.780E+00 | ΑZ | 4.363E-02 | 1.330E-02 | 1.979E+01 | 3.420E-04 | 4.947E+00 |
| CO2 | 6.480E+01 | NA | 7.479E-01 | 2.280E-01 | 3.392E+02 | 5.864E-03 | 8.481E+01 |
| 00 | 1.679E+02 | NA | 1.938E+00 | 5.908E-01 | 8.790E+02 | 1.519E-02 | 2.197E+02 |
| NOx (as NO) | 1.353E+00 | NA | 1.562E-02 | 4.761E-03 | 7.083E+00 | 1.224E-04 | 1.771E+00 |
| CH4 | 2.178E+00 | NA | QN | QN | QN | 9 | Q |
| 802 | 5.240E-01 | NA | _ QN | QN | QN | Q | QN |
| Combined Particulate | | | | | | | |
| тѕр | 4.514E+00 | 5.300E-02 | 5.746E-02 | 1.752E-02 | 2.606E+01 | 4.505E-04 | 6.516E+00 |
| PM10 | 3.875E+00 | 4.233E-02 | 4.937E-02 | 1.505E-02 | 2.239E+01 | 3.871E-04 | 5.598E+00 |
| PM2.5 | 2.074E+00 | 2.400E-02 | 2.641E-02 | 8.050E-03 | 1.198E+01 | 2.070E-04 | 2.994E+00 |
| Metals | | | | | | | |
| Antlmony | 1.819E-04 | 4,345E-06 | QN | DN | QN | Q | 2 |
| Arsenic | 2.814E-04 | 3,091E-06 | 3.585E-06 | 1.093E-06 | 1.626E-03 | 2.811E-08 | 4.066E-04 |
| Barlum | 2.814E-03 | 3.255E-05 | 3.583E-05 | 1.092E-05 | 1.625E-02 | 2.809E-07 | 4.063E-03 |
| Beryllium | 7.796E-05 | 1.649E-06 | Q | QN | QN | QN | QN |
| Cadmium | 7.796E-05 | 1.649E-06 | QN | QN | . ON | QN | 2 |
| Chromlum | 4.978E-04 | 7.167E-06 | 6.320E-06 | 1.927E-06 | 2.867E-03 | 4.955E-08 | 7.167E-04 |
| Cobalt | 8.659E-05 | 3.763E-06 | 1.067E-06 | 3.253E-07 | 4.839E-04 | 8.365E-09 | 1.210E-04 |
| Copper | 2,598E-01 | 1.159E-03 | 3.331E-03 | 1.016E-03 | 1.511E+00 | 2.612E-05 | 3.778E-01 |
| Lead | 2.381E-02 | 6.770E-05 | 3.059E-04 | 9.325E-05 | 1.387E-01 | 2.398E-06 | 3.468E-02 |
| Manganese | 1.992E-03 | 3.086E-05 | 2.526E-05 | 7.700E-06 | 1.146E-02 | 1.980E-07 | 2.864E-03 |
| Nickel | 8.659E-04 | 1.433E-05 | 1.097E-05 | 3,344E-06 | 4.975E-03 | 8.600E-08 | 1.244E-03 |
| Selenlum | 2.599E-04 | 5.497E-06 | Q | ND | QN | QN | QN |
| Silver | 5.197E-05 | 1.099E-06 | Q | ND | ON | Q | Q. |
| Thallium | 7.796E-05 | 1.613E-06 | QN | QN | QN | QN | QN |
| Zinc | 4.544E-02 | 1,445E-04 | 5.835E-04 | 1.779E-04 | 2.647E-01 | 4.575E-06 | 6.617E-02 |
| Footnotes: | ŅĪ. | | | | | | |

'ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study)
ND = Not Detected

Table B-17; Air Modeling Output Data for Volatile Organic Compounds - 200 meter location

| | 100 | Sandle authorized | monaco MCCA (conce) (Manage and melli | A connect | (I) sparior to oN | 1 | rounds |
|---------------------------------------|----------------------------------|---|---------------------------------------|-------------------------------------|--------------------------|-------------------------|--------------------------------|
| | | | DODIC: D540 | | release duration (t): | 4 | seconds |
| | δ O | Net Explosive Weigh | osive Weight (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 6.914E-05 | 6.914E-05 (g/m³)/(g/s) |
| | | Number of | Number of Items = 1 | 898 | | | |
| | | SFO Leak Kalle L | | 0.000 | | | |
| | | Section of the | Succession of the second | | Total Mass of Substance | Average Modeled | Substance Emission Rata for |
| Compound | Measured Actual Concentration | Measured Background Concentration | Average Adjusted Emission Factor | Average Adjusted Emission Factor | (grams/ltem) | One Round (grams/m³) | One Round (g/sec) |
| | (mg/m³) | (mg/m³) | EF | (Ib/Ib NEW) | W | CONC | ER, |
| VOCs | | | | | | | |
| Dichlorodifluoromethane | 3.762E-03 | 3.762E-03 | QN | QN | DN | QN | QN |
| Methyl Chloride | 1.594E-03 | 1.594E-03 | QN | QN | ND | QN | QN |
| Dichlorotetrafluoroethane | 4.683E-03 | 4.683E-03 | QN | QN | DN | ND | DN |
| Vinyl Chloride | 5.069E-03 | 5.069E-03 | QN | QN | ND | NO ON | QN |
| 1,3-Butadlene | 1.790E-03 | 1.790E-03 | ΩN | QN | ND | S | QN |
| Methyl Bromide | 3.073E-03 | 3.073E-03 | QN | QN | ND | QN. | QQ |
| Ethyl Chloride | 2.112E-03 | 2.112E-03 | ON | QN | QN | ND ND | QN |
| Trichtorofluoromethane | 3.934E-03 | 3.934E-03 | QN | QN | QN | QN | ND |
| 1,1-Dichloroethene | 9.339E-03 | 6.696E-03 | 3.405E-05 | 1.038E-05 | 1.544E-02 | 2.669E-07 | 3.861E-03 |
| Dichtoromethane | 2.436E-01 | 5,722E-03 | 3.064E-03 | 9,341E-04 | 1.390E+00 | 2.402E-05 | 3.474E-01 |
| 3-Chloropropene | 2.754E-03 | 2.754E-03 | QN | QN· | QN | ND | QN |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 5.148E-03 | 5.750E-03 | QN | QN | QN | ND | QN |
| 1,1-Dichloroethane | 3.159E-03 | 3.159E-03 | QN | QN | QN | ON | QN |
| cis-1,2-Dichloroethene | 3.295E-03 | 3.295E-03 | QN | QN | QN | ON | QN |
| Trichloromethane | 4.099E-03 | 4.099E-03 | QN | QN | QN | ON | QN |
| 1,2-Dichloroethane | 3.443E-03 | 3.443E-03 | QN | QN | ND | QN | QN |
| 1,1,1-Trichloroethane | 7.867E-02 | 1.095E-01 | QN | Q | QN | 2 | 2 |
| Benzene | 4.807E-02 | 2.329E-03 | 6.192E-04 | 1.888E-04 | 2.808E-01 | 4,854E-06 | 7.021E-02 |
| Carbon Tetrachloride | 4.529E-03 | | ND | 2 | QN | QN | 2 |
| 1,2-Dichloropropane | 3,419E-03 | 3.419E-03 | QN | Q | QN | QN | 9 |
| Trichloroethene | 3.866E-03 | | S | 2 | QN | QN | 2 |
| cls-1,3-Dichloropropene | 3.360E-03 | | QN | Q | QN | S | 2 |
| trans-1,3-Dichloropropene | 2.860E-03 | | QN | QN | ND | S S | Q |
| 1,1,2-Trichioroethane | 3.877E-03 | | QN | QN | ON | GN | Q |
| Toluene | 4.247E-03 | 3.610E-03 | 8.207E-06 | 2.502E-06 | 3.723E-03 | 6.435E-08 | 9.307E-04 |
| 1,2-Dibromoethane | 5.844E-03 | 5.844E-03 | ND | QN | QN | S | 2 |
| Tetrachloroethene | 4.475E-03 | 4.475E-03 | Q | QN | ND | an | QN |
| | | | | | | | |

Table B-17: Air Modeling Output Data for Volatile Organic Compounds - 200 meter location

| | 155mm pro | propelling charge | pelling charge M3 (zone 3), M284 cannon DODIC: D540 | 4 cannon | No. of rounds (!) | 1 4 | rounds |
|---------------------------|----------------------------------|---|--|--|--------------------------|--|---|
| | Ö, | Net Explosive Weight (NEW) in lbs. Number of Items = 1 | /e Weight (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 6.914E-05 | 6.914E-05 (g/m³)/(g/s) |
| | | SF6 Leak Rate Dilution Factor | Ilution Factor => | 0.898 | | | |
| | | | Declaration of the country | Assessment of the Comment of the Com | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background | Average Adjusted Emission Factor | Average Adjusted Emission Factor | Emitted (grams/item) | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) |
| | (mg/m³) | Concentration (mg/m³) | (lb/item) EF | (Ib/Ib NEW) | W | CONC | ER, |
| Chlorobenzene | 2.305E-04 | 2.305E-04 | QN | ΩN | ON | QN | QN |
| Ethylbenzene | 2.344E-03 | 2.344E-03 | ND | QN | ND | ND | ON |
| m&p-Xylene | 2,257E-03 | 2.257E-03 | QN | QN | DN | ND | QN |
| Styrene | 2.641E-03 | 2.641E-03 | QN | QN | DN | ND | ND |
| 1,1,2,2-Tetrachloroethane | 4,466E-03 | 4,466E-03 | QN | ON | ON | ΩN | DN |
| o-Xylene | 2.474E-03 | 2.474E-03 | QN | QN | ND | ND | ND |
| 4-Ethyltoluene | 2.214E-03 | 2.214E-03 | QN | QN | ON | ND | QN |
| 1,3,5-Trimethylbenzene | 2.460E-03 | 2.460E-03 | ON | ΩN | QN | ND | QN |
| 1,2,4-Trimethylbenzene | 2.312E-03 | 2.312E-03 | ON | ON | GN | ND | QN |
| Benzyl Chloride | 5.076E-03 | 5.076E-03 | QN | QN | ND | QN | QN |
| m-Dichlorobenzene | 3.366E-03 | 3.366E-03 | QN | QN | ND | ON | ND |
| p-Dichlorobenzene | 2.945E-03 | 2.945E-03 | QN | QN | ND | ND | ND |
| o-Dichlorobenzene | 3.606E-03 | 3.606E-03 | QN | QN | ND | ON | QN ND |
| 1,2,4-Trichlorobenzene | 4.526E-03 | 4,526E-03 | QN | ON | ON | QN | NΩ |
| Hexachlorobutadiene | 4.690E-03 | 4.690E-03 | SD | S | , ON | QN ON | ΩN |
| Methane | 2.023E+00 | 1.364E+00 | 8.488E-03 | 2,588E-03 | 3.850E+00 | 6.655E-05 | 9.625E-01 |
| Ethane | 6.764E-01 | 6.764E-01 | ND | SD | ND | QN | ND |
| Ethylene | 6.310E-01 | 6.310E-01 | QN | QN | QN | ON | ON |
| Propane | 9.920E-01 | 9.920E-01 | QN | ON | QN | ON | ND |
| Acetylene | 5.858E-01 | 5.858E-01 | ND | QN | QN | ON | ON |
| Isobutane | 1.307E+00 | 1.307E+00 | ND | ND | QN | ON | ON |
| n-Butane | 1.307E+00 | 1.307E+00 | ND P | QN | ND | QN | ON |
| Propylene | 9.466E-01 | 9.466E-01 | ND | ND | QN | ON | ON |
| Footnotes: | | | | | | | |

Footnotes: |ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) |ND = Not Detected

Table B-18: Air Modeling Output Data for Semi-Volatile Organic Compounds - 200 meter location

| | | | | | | | • |
|-----------------------------|---|--|--|--|-----------------------------|--|--|
| | 155mm prop | propelling charge | elling charge M3 (zone 3), M284 cannon | 4 cannon | No. of rounds (1) | - ~ | rounds |
| | | IGOG | DODIC: DS40 | | release duration (t): | 4 | seconds |
| | Ne | Net Explosive Weigh | osive Weight (NEW) in ibs. => | 3.28 | Unit Concentration (UC): | 6.914E-05 | 6.914E-05 (g/m³)/(g/s) |
| | | Number of SF6 Leak Rate D | Number of Items = 1 Leak Rate Dilution Factor => | 0.896 | | | |
| | | | Course of the | The state of the s | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (lb/item) EF | Average Adjusted Emission Factor (lb/lb NEW) | Emitted (grams/lem) M | Concentration for One Round (grams/m³) | Emission Kate for One Round (g/sec) ER, |
| SVOCs | | | | | | | |
| n-nitrosodimethylamine | 2.572E-03 | 2.236E-03 | 2 | QN | QN | QN | QN |
| bis(2-chloroethyl)ether | 2.572E-03 | 2.236E-03 | Q | QN | QN | QN | QN |
| phenol | 2.058E-02 | 1.923E-02 | 1.743E-05 | 5.314E-06 | 7.906E-03 | 1.367E-07 | 1.977E-03 |
| 2-chlorophenol | 2.572E-03 | | QN | QN | QN | QN | QN |
| 1,3-dichlorobenzene | 2.572E-03 | 2.236E-03 | Q | QN | ΩN | QN | Q |
| 1,4-dichlorobenzene | 2.572E-03 | | ON | QN | QN | QN | QN |
| 1,2-dichlorobenzene | 2.572E-03 | 2.236E-03 | QN | QN | QN | QN | QN |
| benzyl alcohol | 2.572E-03 | 2.236E-03 | QN | QN | ND | ON | QN |
| bis(2-chlorolsopropyl)ether | 2.572E-03 | 2.236E-03 | QN | QN | ND | QN | QN |
| 2-methylphenol | 2.572E-03 | 2.236E-03 | QN | QN | ND | QN | ND |
| hexachloroethane | 2.572E-03 | 2.236E-03 | QN | QN | QN | ON , | ON |
| n-nitroso-di-n-propylamine | 2.572E-03 | 2.236E-03 | QN | QN | GN | ON | QN |
| 4-methylphenol | 2.572E-03 | 2.236E-03 | QN | QN | QN | QN | QN |
| nitrobenzene | 2.572E-03 | 2.236E-03 | QN | QN | QN | QN | QN |
| Isophorone | 2.572E-03 | | QN | QN | QN | ON | QN |
| 2-nitrophenol | 2.572E-03 | | ON | Q | QN | S | QN |
| 2,4-dimethylphenol | 2.572E-03 | | QN | QN | QN | ON. | QN |
| bis(2-chloroethoxy)methane | 2.572E-03 | 2.236E-03 | QN | Q | QN | 8 | S |
| 2,4-dichlorophenol | 2.572E-03 | 2.236E-03 | QN | QN | ND | ON | ND |
| 1,2,4-trichlorobenzene | 2.572E-03 | 2.236E-03 | QN | QN | QN | QN | ND |
| naphthalene | 3,659E-03 | 2.236E-03 | 4.713E-05 | 1.437E-05 | 2.138E-02 | 3.695E-07 | 5.344E-03 |
| 4-chloroaniline | 2.572E-02 | 2.236E-02 | ON | QN | QN | QN | ON. |
| hexachlorobutadiene | 2.572E-03 | 2.236E-03 | QN | QN | ND | ΩN | ON |
| 4-chloro-3-methylphenol | 2.572E-03 | | ON | QN | QN | ΩN | QN |
| 2-methylnaphthalene | 2.572E-03 | 2.236E-03 | QN | QN | QN | GN | QN |
| hexachlorocyclopentadlene | 2.572E-03 | 2.236E-03 | S | Q | QN | DD | S |
| 2,4,6-trichlorophenol | 2.572E-03 | 2.236E-03 | Q | 2 | ON | QV | 2 |
| | | | | | | | |

Table B-18: Air Modeling Output Data for Semi-Volatile Organic Compounds - 200 meter location

| | 155mm | propelling charge DODI | 155mm propelling charge M3 (zone 3), M284 cannon DODIC: D540 | t cannon | No. of rounds (I) release duration (t): | 1 4 | 1 rounds 4 seconds |
|----------------------------|-----------------|--|---|------------------|--|-----------------------------|---|
| | -Ne | Net Explosive Weight (NEW) in Ibs. | t (NEW) in ths. => | 3.28 | Unit Concentration (UC): | 6.914E-05 | 6.914E-05 (g/m³)/(g/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 sk Rate Dilution Factor => | 0.896 | | | |
| | | | | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual | Measured Background | Average Adjusted Emission Factor | Average Adjusted | Emitted (grams/item) | Concentration for One Round | Emission Rate for One Round (d/sec) |
| | (mg/m³) | Concentration (mg/m³) | (lb/ltem) EF | (lb/lb NEW) | W | CONC | ER, |
| 2,4,5-trichlorophenol | 2.572E-03 | 2.236E-03 | QN | QN | QN | QN | QN |
| 2-chloronaphthalene | 2.572E-03 | 2.236E-03 | QN | QN | QN | QN | QN |
| 2-nitroaniline | 2.572E-03 | 2.236E-03 | QN | ON | ON | QN | QN |
| dimethylphthalate | 2.572E-03 | 2.236E-03 | QN | QN | QN | QN | S |
| 2,6-dinitrotoluene | 2.572E-03 | 2.236E-03 | QN | QN | ON | ND | QN |
| 3-nitroaniline | 5.144E-03 | 4.471E-03 | QN | QN | QN | QN | QN |
| 2,4-dinitrophenol | 5.144E-03 | 4.471E-03 | QN | QN | QN | QN | QN |
| dibenzofuran | 2.572E-03 | 2.236E-03 | QN | ND | QN | QN | Q |
| 2,4-dinitrotoluene | 2.572E-03 | 2.236E-03 | QN | QN | ON | QN | QN |
| 4-nitrophenol | 5.144E-03 | 4.471E-03 | QN | QN | ND | QN | QN |
| 4-chlorophenyl-phenylether | 2.572E-03 | 2.236E-03 | QN | QN | QN | ND | QN |
| diethylphthalate | 2.572E-03 | 2.236E-03 | QN | QN | ND | ND | ΩN |
| 4-nitroanlline | 5.144E-03 | 4.471E-03 | Q. | S | ND | ND | QN |
| 4,6-dinitro-2-methylphenol | 5.144E-03 | 4.471E-03 | <u>Q</u> | QN | ON | ND | QN |
| n-nitrosodlphenylamine(1) | 2.572E-03 | 2.236E-03 | 오 | QN | QN | ND | QN |
| 4-bromophenyl-phenylether | 2.572E-03 | 2.236E-03 | ΩN | QN | ND | ND | QN |
| hexachlorobenzene | 2.572E-03 | 2.236E-03 | QN | ON | QN | ND | QN |
| pentachlorophenol | 5,144E-03 | 4.471E-03 | QN | QN | QN | Q | QN |
| di-n-butylphthalate | 2.572E-03 | 2.236E-03 | ON | QN | QN | QN | QN |
| butylbenzylphthalate | 2.572E-03 | 2.236E-03 | QN | QN | QN | ON | QN |
| bis(2-ethylhexyl)phthalate | 1.269E-01 | 5.813E-02 | 8.853E-04 | 2.699E-04 | 4.015E-01 | 6.941E-06 | 1.004E-01 |
| di-n-octylphthalate | 2.572E-03 | 2.236E-03 | ND | ON | QN | QN | ND |
| Footnotes: | | | | | | | |

'ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study)
ND = Not Detected

Table B-19: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases 200 meter location

| | 155mm | propelling charge | 155mm propelling charge M3 (zone 3), M284 cannon | 4 cannon | No. of rounds (I) | | rounds |
|------------------------|--|-------------------------------|--|--|--------------------------|--------------------|----------------------------------|
| | | DOD | DODIC: D540 | | release duration (t): | . 4 | seconds |
| | N | Net Explosive Weigh | olosive Weight (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 6.914E-05 | 6.914E-05 (g/m³)/(g/s) |
| | | Number | Number of items = 1 | | | | |
| | | SF6 Leak Rate Dilution Factor | ollution Factor => | 0.896 | | | |
| | The state of the s | Output South | Softward Mile of Descriptions | Section of the sectio | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual | Measured | Average Adjusted | Average Adjusted | Emitted (grams/item) | One Round | Cillission Rate for One Round |
| | Concentration (mg/m³) | Concentration (mg/m³) | (Ib/Item) EF | Emission Factor (Ib/Ib NEW) | Σ | (grams/m²) CONC | (g/sec) ER, |
| PAHs (TO-13 Method) | | | | - | | | |
| acenaphthylene | 5.945E-04 | 6.260E-06 | 7.578E-06 | 2.310E-06 | · 3.437E-03 | 5.941E-08 | 8.593E-04 |
| acenaphthene | 2.275E-04 | 9.166E-05 | 1.750E-06 | 5.334E-07 | 7.936E-04 | 1.372E-08 | 1.984E-04 |
| fluorene | 2.944E-04 | 8.495E-05 | 2.698E-06 | 8.224E-07 | 1.224E-03 | 2.115E-08 | 3,059E-04 |
| phenanthrene | 5.287E-04 | 1.453E-04 | 4.938E-06 | 1.506E-06 | 2.240E-03 | 3.872E-08 | 5.600E-04 |
| anthracene | 6.603E-05 | 6.707E-06 | 7.641E-07 | 2.330E-07 | 3.466E-04 | 5.991E-09 | 8.665E-05 |
| fluoranthene | 2.244E-04 | 2.459E-05 | 2.573E-06 | 7.845E-07 | 1.167E-03 | 2.018E-08 | 2.918E-04 |
| pyrene | 5.831E-04 | 2.191E-05 | 7.229E-06 | 2.204E-06 | 3.279E-03 | 5.667E-08 | 8.197E-04 |
| benzo(a)anthracene | 3.944E-05 | 2.236E-06 | 5.081E-07 | 1.549E-07 | 2.305E-04 | 3.983E-09 | 5.761E-05 |
| chrysene | 3.830E-05 | 2.236E-06 | 4.933E-07 | 1.504E-07 | 2.238E-04 | 3.868E-09 | 5.594E-05 |
| benzo(b)fluoranthene | 8.890E-05 | 3.353E-06 | 1.102E-06 | 3.360E-07 | 4.998E-04 | 8.640E-09 | 1,250E-04 |
| benzo(k)fluoranthene | 7.431E-05 | 2.459E-06 | 9.255E-07 | 2.822E-07 | 4.198E-04 | 7.256E-09 | 1.049E-04 |
| benzo(a)pyrene | 1.409E-04 | 2.906E-06 | 1.778E-06 | 5.420E-07 | 8.063E-04 | 1.394E-08 | 2.016E-04 |
| indeno(1,2,3-cd)pyrene | 2.218E-04 | 7.601E-06 | 2.759E-06 | 8.412E-07 | 1.252E-03 | 2.163E-08 | 3.129E-04 |
| dibenz(a,h)anthracene | 8.432E-06 | 3.130E-06 | 6.829E-08 | 2.082E-08 | 3.098E-05 | 5.354E-10 | 7.744E-06 |
| benzo(g,h,l)perylene | 5.202E-04 | 1.185E-05 | 6.548E-08 | 1,996E-06 | 2,970E-03 | 5.134E-08 | 7.425E-04 |
| Dioxin/Furan Data | | | | | | | |
| 2378-TCDD | 7.755E-10 | 8.000E-12 | 9.989E-12 | 3.045E-12 | 4.531E-09 | 7.832E-14 | 1.133E-09 |
| 12378-PECDD | 2.710E-10 | 9.000E-12 | ON S | 2 | ON C | 2 2 | |
| 123478-HXCDD | 4.990E-10 | 1.050E-11 | ND 7 Oper 40 | ND 440F 42 | UN COLL OF | ND S 224E 44 | ND OCCUTAGO |
| 1236/8-HXCUU | 0,330⊏-10 | 1./000=11 | 71-3006-17 | 71-120-17 | 3.039E-03 | 0.2215-14 | 0.990E-10 |
| 123789-HXCDD | 2.635E-10 | 1.550E-11 | 3.194E-12 | 9.739E-13 | 1.449E-09 | 2.505E-14 | 3.622E-10 |
| 1234678-HPCDD | 5.851E-09 | 2,495E-10 | 7.215E-11 | 2.200E-11 | 3.272E-08 | 5.656E-13 | 8.181E-09 |
| ocop | 4.574E-08 | 1.587E-09 | 5.687E-10 | 1.734E-10 | 2.580E-07 | 4.459E-12 | 6.449E-08 |
| 2378-TCDF | 5.110E-10 | 1.100E-11 | 6,440E-12 | 1.964E-12 | 2,921E-09 | 5.049E-14 | 7.303E-10 |
| 12378-PECDF | 2,975E-10 | 1.050E-11 | QQ | QN | QN | Q. | QV |
| 23478-PECDF | 2.480E-10 | 1.550E-11 | 2.995E-12 | 9.130E-13 | 1.358E-09 | 2,348E-14 | 3.396E-10 |
| 123478-HXCDF | 4.410E-10 | 2.800E-11 | 5.320E-12 | 1.622E-12 | 2.413E-09 | 4.171E-14 | 6.032E-10 |
| 123678-HXCDF | 2.270E-10 | 1.450E-11 | 2.737E-12 | 8.345E-13 | 1.242E-09 | 2.146E-14 | 3.104E-10 |
| 123789-HXCDF | 2.895E-10 | 6.000E-12 | Q | 2 | QN | Q | QQ |

1/16/01

Table B-19: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases 200 meter location

| ZOU MENE IOCAMON | 101 | | | | | | |
|--------------------------|-----------------|--|--|------------------|--------------------------|-----------------------------|---|
| | 155mm | propelling charge | 155mm propelling charge M3 (zone 3), M284 cannon | 4 cannon | No. of rounds (I) | 1 | rounds |
| | | 1000 | DODIC: D540 | | release duration (t): | 4 | seconds |
| | eN N | Net Explosive Weigh | plosive Weight (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 6.914E-05 | 6.914E-05 (g/m³)/(g/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | of Items = 1 | 0.896 | | | |
| | i som | Walke United To See | A THE GREEK | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual | Measured Background | Average Adjusted Emission Factor | Average Adjusted | Emitted (grams/item) | Concentration for One Round | Emission Rate for One Round (q/sec) |
| | (mg/m³) | Concentration (mg/m³) | (lb/ltem) EF | (Ib/Ib NEW) | Σ | CONC | ER, |
| 234678•HXCDF | 2.395E-10 | 1.200E-11 | QN | 'QN | QN | QN | QN |
| 1234678-HPCDF | 1.954E-09 | 7.750E-11 | 2.416E-11 | 7,367E-12 | 1.096E-08 | 1.895E-13 | 2.740E-09 |
| 1234789-HPCDF | 2.900E-10 | 8.000E-12 | QN | QN | QN | QN | QN |
| OCDF | 2.410E-09 | 1.105E-10 | 2.962E-11 | 9.030E-12 | 1.344E-08 | 2.322E-13 | 3.359E-09 |
| Aldehydes | | | | | | | |
| Formaldehyde | 1.228E-02 | 1.228E-02 | QN | QN | ND | QN | QN |
| Acetaldehyde | 1.802E-02 | 1.802E-02 | ND | QN | QN | QN | QN |
| Acetone | 3.563E-02 | 4.751E-02 | QN | QN | QN | QN | QN |
| Acrolein | 2.294E-02 | 2.294E-02 | QN | QN | QN | ON | QN |
| Proprionaldehyde | 2.374E-02 | 2.374E-02 | QN | QN | QN | QN | QN |
| Crotonaldehyde | 2.867E-02 | 2.867E-02 | QN | QN | QN | QN | QN |
| Butyraldehyde | 2.949E-02 | 2.949E-02 | ND | QN | QN | QN | QN |
| Benzaldehyde | 4.340E-02 | 4.340E-02 | ON | QN | QN | QN | QN |
| Isovaleraldehyde | 3.523E-02 | 3.523E-02 | ON | QN | QN | QN | QN |
| Valeraldehyde | 3.523E-02 | 3.523E-02 | QN | QN | QN | QN | QN |
| o,m,p-Tolualdehyde | 9.828E-02 | 9.828E-02 | ND | QN | ND | ΩN | QN |
| Hexaldehyde | 4.097E-02 | 4.097E-02 | ON | QN | QN | QN | QN |
| 2,5-Dimethylbenzaldehyde | 4.097E-02 | 4.097E-02 | QN | QN | QN | QN | QN |
| Acid gases | | | | | | | |
| Hydrogen fluoride | 1,400E-01 | 1.400E-01 | ND | QN | ND | GN | QN |
| Hydrogen chloride | 1.300E-01 | 1.300E-01 | QN | QN | QN | ΩN | QN |
| Hydrogen bromide | 1.400E-01 | 1.400E-01 | ON N | QN | QN | ΩN | QN |
| Nitric Acid | 2.050E-01 | 2.200E-01 | ND | QN | ND | ΩN | QN |
| Phosphoric acld | 1.400E-01 | 1,400E-01 | QN | S | ND | QN | QN |
| Sulfuric Acid | 2.150E-01 | 1.400E-01 | 2.769E-03 | 8,443E-04 | 1,256E+00 | 2.171E-05 | 3.140E-01 |
| Footnotes: | | | | | | | |

ootnotes:

ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study)
ND = Not Detected

Table B-20: Air Modeling Output Data for Cyanide and Energetics - 200 meter location

| | 155mm | propelling charge | 155mm propelling charge M3 (zone 3), M284 cannon | 4 cannon | No. of rounds (I) | 1 | rounds |
|-----------------------------|---|--|--|--|------------------------------|---------------------------------------|--|
| | | DODIK | DODIC: D540 | | release duration (t): | 4 | 4 seconds |
| | eN. | Net Explosive Weight | losive Weight (NEW) in lbs. => | 3.28 | Unit Concentration (UC): | 6.914E-05 | 6.914E-05 (g/m³)/(g/s) |
| | | Number of SF6 Leak Rate D | Number of Items = 1 Leak Rate Dilution Factor => | 0.896 | | | |
| | | WASTER FILLE | EXCEPTION PARTICIONS | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (Ib/Item) EF | Average Adjusted Emission Factor (Ib/Ib NEW) | Emitted (grams/Item) M | Concernation for One Round (grams/m³) | Critission Rate for One Round (g/sec) ER, |
| Particulate Cvanide and HCN | | | | | | | |
| Particulate Cyanide | 8.000E-02 | 8.000E-02 | Q | QN | QN | QN | QN |
| Hydrogen Cyanide | 1.350E+00 | 8.500E-02 | 1.739E-02 | 5.302E-03 | 7.888E+00 | 1.363E-04 | 1.972E+00 |
| Energetics Data | | | | | | | |
| Nitrobenzene | 4.704E-01 | 2.031E-01 | QN | QN | QN | QN | QN |
| 2-Nitrotoluene | 4.704E-01 | 2.031E-01 | ON | Q | ND | Q | Q |
| 3-Nitrotoluene | 4.704E-01 | 2.031E-01 | QN | QN | ND | QN | Q |
| 4-Nitrotoluene | 4.704E-01 | 2.031E-01 | QN | QN | ND | QN | QN |
| Nitroglycerine | 4.704E-01 | 2.031E-01 | QN | Q | QN | Q | Q |
| 1,3-Dinitrobenzene | 4.704E-01 | 2.031E-01 | 2 | 2 | QN | QN | QN |
| 2,6-Dinitrotoluene | 4.704E-01 | 2.031E-01 | QN | Q | QN | QQ. | QV |
| 2,4-Dinitrotoluene | 4.704E-01 | 2.031E-01 | QN | QN | QN | ΩN | ΩN |
| 1,3,5-Trinltrobenzene | 4.704E-01 | 2.031E-01 | 2 | 2 | ON. | Q | Q |
| 2,4,6-Trinitrotoluene | 4.704E-01 | 2.031E-01 | QN | QN | QN | ΩN | Q |
| RDX | 4.704E-01 | 2.031E-01 | QN | Q | QN | QN | QN |
| 4-Amino-2,6-Dinitrotoluene | 4.704E-01 | 2.031E-01 | ON | QN | QN | QN | QN |
| 2-Amino-4,6-Dinitrotoluene | 4.704E-01 | 2.031E-01 | QN | QN | ND | QV. | ND |
| Tetryi | 4.704E-01 | 2.031E-01 | ON | ON | QN | QN | Q |
| HMX | 9.408E-01 | 4.062E-01 | QN | QN | QN | Q | Q |
| Pentaerythritoltetranitrate | 9.408E-01 | 4.062E-01 | ΩN | ON | ON | QN | QQ |
| Dibutyl phthalate | 2.352E+01 | 1.016E+01 | QN | QN | QN | QN | Q |
| Dioctyl phthalate | 2.352E+01 | 1.016E+01 | QN | QN | QN | Q | Q |
| Diphenylamine | 1.176E+01 | 5.078E+00 | NΩ | ND | ND | QN | ND |
| | | | | | , | | |

Footnotes:

¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study)
ND = Not Detected

AIR MODELING OUTPUT DATA FOR CHARGE M3, FIRED FROM THE M199 CANNON, ZONE 5, 100 METERS DOWNWIND

Table B-21: Air Modeling Output Data for Gases, Metals, and Particulates - 100 meter location

| | 155mm nro | pronoffing charge | colling charge M3 (2000 E) 88400 control | | 77 THE ST. LEWIS CO. | | |
|----------------------|---|------------------------------------|---|--|--------------------------|--|---|
| | | DODI | DODIC: D540 | 9 Call | release duration (t): | 2 | rounds seconds |
| | Š | Net Explosive Weight (NEW) in Ibs. | t (NEW) in ibs. => | 5.94 | Unit Concentration (UC): | 1.455E-04 | |
| | | Number SF6 Leak Rate D | Number of Items = 1 6 Leak Rate Dilution Factor => | 0.95 | | | (6/8)/ |
| | | September 1 | Security of the track of the second | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | | Average Adjusted Emission Factor (lb/ltem) | Average Adjusted Emission Factor (lb/lb NEW) | Emitted (grams/Item) | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) |
| 20000 | | , | | | iv. | CONC | EK1 |
| Odabas NH3 | 8 400E±00 | VIA | 2000 | 4 6007 00 | Live | | |
| CO2 | 1.080E+02 | ¥. | 1.246E+00 | 2.098E-01 | 5.654F+02 | 3.199E-03 4.443E.02 | 2.199E+01 |
| 00 | 2.841E+02 | NA | 3,278E+00 | 5.519E-01 | 1.487E+03 | 1.082E-01 | 7.435E+02 |
| NOx (as NO) | 3.936E+00 | NA | 4.543E-02 | 7.647E-03 | 2.060E+01 | 1.499E-03 | 1.030E+01 |
| CH4 | 2.178E+00 | NA A | GN | QN | ON | QN | QN |
| S02 | 5.240E-01 | ۷A | Q | QN | QN | Q | CN |
| Combined Particulate | | | | | | | |
| TSP | 1.122E+01 | 5.300E-02 | 1.356E-01 | 2.284E-02 | 6.153E+01 | 4.476E-03 | 3.076E+01 |
| PM10 | 8.017E+00 | 4.233E-02 | 9.688E-02 | 1.631E-02 | 4.394E+01 | 3.197E-03 | 2.197E+01 |
| PM2.5 | 3.180E+00 | 2.400E-02 | 3.834E-02 | 6.455E-03 | 1.739E+01 | 1.265E-03 | 8.696E+00 |
| Metals | | | | | | | |
| Antimony | 2.819E-04 | 4.345E-06 | 3.371E-06 | 5.676E-07 | 1.529E-03 | 1.113E-07 | 7.646E-04 |
| Arsenic | 6.180E-04 | 3.091E-06 | 7.470E-06 | 1.258E-06 | 3.388E-03 | 2.465E-07 | 1,694E-03 |
| Barium | 6.071E-03 | 3.255E-05 | 7.336E-05 | 1.235E-05 | 3.327E-02 | 2.421E-06 | 1.664E-02 |
| Beryllium | 7.806E-05 | 1.649E-06 | Q | QN | QN | QN | QN |
| Cadmium | 2.103E-04 | 1.649E-06 | 2.555E-06 | 4.301E-07 | 1.159E-03 | 8.431E-08 | 5.795E-04 |
| Chromiam | 1.334E-03 | 7.167E-06 | 1.611E-05 | 2.713E-06 | 7.309E-03 | 5.317E-07 | 3.654E-03 |
| Coball | 1.7 135-04 | 3.763E-06 | 2.035E-06 | 3.426E-07 | 9.231E-04 | 6.716E-08 | 4.616E-04 |
| Copper | 1.518E+00 | 1.159E-03 | 1.842E-02 | 3.102E-03 | 8.357E+00 | 6.080E-04 | 4.179E+00 |
| Lead | 3.036E-02 | 6.770E-05 | 3.680E-04 | 6.195E-05 | 1.669E-01 | 1.214E-05 | 8.345E-02 |
| Manganese | 7.480E-03 | 3.086E-05 | 9.050E-05 | 1.524E-05 | 4.105E-02 | 2.986E-06 | 2.053E-02 |
| Nickel | 2.494E-03 | 1.433E-05 | 3.012E-05 | 5.071E-06 | 1.366E-02 | 9.939E-07 | 6.831E-03 |
| Selentum | 2.602E-04 | 5.497E-06 | QN | 2 | QN | QN | Q |
| Silver | 1.019E-04 | 1.099E-06 | 1.238E-06 | 2.084E-07 | 5.615E-04 | 4.085E-08 | 2.808E-04 |
| Inalium Zino | 7.806E-05 | 1.613E-06 | Q | 2 | QN | ND | QN |
| Olary L | Z.300E-UI | 1.445E-04 | Z.896E-03 | 4.875E-04 | 1.314E+00 | 9.556E-05 | 6.568E-01 |

Footnotes: 'ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study)
ND = Not Detected

Table B-22: Air Modeling Output Data for Volatile Organic Compounds - 100 meter location

| | 155mm | propelling charge | 155mm propelling charge M3 (zone 5), M199 cannon | eannon can | No. of rounds (I) | 1 | rounds |
|---------------------------------------|----------------------------------|---|--|--|--------------------------|----------------------|--------------------------|
| | | Idoa | DODIC: D540 | | release duration (t): | 2 | seconds |
| | e N | Net Explosive Weigh | osive Weight (NEW) in lbs. => | 5.94 | Unit Concentration (UC): | 1.455E-04 | 1.455E-04 (g/m³)/(g/s) |
| | | Number of Rate Pate | Number of Items = 1 | 0.95 | | | |
| | | STATE | | The state of the s | Total Mass of Substance | Average Modeled | Substance |
| | Sand Co Way water his about | Citibina Colar | | | Emitted | Concentration for | Emission Rate for |
| Compound | Measured Actual Concentration | Measured | Average Adjusted Emission Factor | Average Adjusted Emission Factor | (grams/ltem) | One Round (grams/m³) | One Round (g/sec) |
| | (mg/m³) | (mg/m³) | (io/item) EF | (Ib/Ib NEW) | Σ | CONC | ER, |
| VOCs | | | | | | | |
| Dichlorodifluoromethane | 3.762E-03 | 3.762E-03 | Q | 9 | ND | Q | <u>Q</u> |
| Methyl Chloride | 1.594E-03 | 1.594E-03 | 2 | QN | ND | ON | 9 |
| Dichlorotetrafluoroethane | 4.683E-03 | 4.683E-03 | Q | QN | ND | Q | 9 |
| Vinyl Chloride | 5.069E-03 | 5.069E-03 | QN | QN | ND | Q | Q |
| 1.3-Butadiene | 1.790E-03 | 1.790E-03 | QN | QN | QN | Q | 2 |
| Methyl Bromide | 3.073E-03 | 3.073E-03 | QN | QN | QN | QN | 2 |
| Ethyl Chloride | 2.112E-03 | 2.112E-03 | DN | QN | QN | QN | QN |
| Trichlorofluoromethane | 3.934E-03 | 3.934E-03 | ND | QN | ND | QN | QN |
| 1.1-Dichloroethene | 9.184E-03 | 6.696E-03 | 3.023E-05 | 5.090E-06 | 1.371E-02 | 9.977E-07 | 6.857E-03 |
| Dichloromethane | 1.519E-01 | 5.722E-03 | 1.776E-03 | 2.989E-04 | 8.054E-01 | 5.860E-05 | 4.027E-01 |
| 3-Chloropropene | 2.754E-03 | 2.754E-03 | QN | Q | QN | Q | QN |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 4.752E-03 | 5,750E-03 | QN | Q | QN | Q | Q. |
| 1,1-Dichloroethane | 3.159E-03 | 3,159E-03 | Q | Q | ON | QN | QN |
| cis-1,2-Dichloroethene | 3.295E-03 | 3.295E-03 | Q | QN | ON | Q | QN |
| Trichtoromethane | 4.099E-03 | | 2 | Q | Q | QN : | Q ! |
| 1,2-Dichloroethane | 3.443E-03 | 3.443E-03 | QN | Q | QN : | 2 | 2 |
| 1,1,1-Trichloroethane | 2.070E-02 | | QN . | ON I | ON Troot | ON CO | UND COOC |
| Benzene | 7.375E-02 | 2.329E-03 | 8.959E-04 | 1.508E-04 | 4.064E-01 | Z.930E-U3 | Z.U3ZE-U1 |
| Carbon Tetrachloride | 4.529E-03 | 4.529E-03 | Q ! | | ON C | 2 2 | 2 2 |
| 1,2-Dichtoropropane | 3.419E-03 | 3.419E-03 | CN SI | S | ON A | 2 2 | 2 2 |
| Trichtoroethene | 3.866E-03 | 3.866E-03 | 2 | ON. | | ON: | 25 |
| cls-1,3-Dichloropropene | 3.360E-03 | 3.360E-03 | Q | Q. | QN | Q. | 2 |
| trans-1,3-Dichloropropene | 2.860E-03 | 2.860E-03 | Q | Q | QN | QV. | Q . |
| 1,1,2-Trichloroethane | 3.877E-03 | 3.877E-03 | QV | Q | QN | QN | QN |
| Toluene | 5.655E-03 | 3.610E-03 | 2.485E-05 | 4.183E-06 | 1.127E-02 | 8.199E-07 | 5.635E-03 |
| 1,2-Dibromoethane | 5.844E-03 | 5.844E-03 | Q | QN | QN | ON I | 2 |
| Tetrachloroethene | 4.475E-03 | 4.475E-03 | QN | QN | ON. | ON | ON I |

Table B-22: Air Modeling Output Data for Volatile Organic Compounds - 100 meter location

| | 155mm pro | propelling charge DODI | pelling charge M3 (zone 5), M199 cannon DODIC: D540 | 9 cannon | No. of rounds (I) release duration (t): | 1 2 | 1 rounds 2 seconds |
|---------------------------|--------------------------|-------------------------------|--|--------------------------------|---|-----------------------------|--------------------------------|
| | ΘN. | Net Explosive Weigh | plosive Weight (NEW) in lbs. => Number of Items = 1 | 5.94 | Unit Concentration (UC): | 1.455E-04 | 1.455E-04 (g/m³)/(g/s) |
| | | SF6 Leak Rate Dilution Factor | Mution Factor => | 0,95 | | | |
| | | ANGERIE BELLEON | Western policy | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual | Measured | Average Adjusted Emission Factor | Average Adjusted | Emitted (grams/item) | Concentration for One Round | Emission Rate for One Round |
| | Concentration (mg/m³) | Concentration (mg/m³) | (lb/ltem) EF | Emission Factor (tb/lb NEW) | W | (grams/m) CONC | (g/sec) ER, |
| Chlorobenzene | 2.305E-04 | 2.305E-04 | QN | QN | ON | QN | QN |
| Ethylbenzene | 2.344E-03 | 2.344E-03 | QN | ΩN | QN | S | QN |
| m&p-Xylene | 2.257E-03 | 2.257E-03 | QN | QN | ND | QN | QN |
| Styrene | 2.641E-03 | 2.641E-03 | QN | QN | QN | QN | QN |
| 1,1,2,2-Tetrachloroethane | 4.466E-03 | 4.466E-03 | QN | QN | QN | ND | QN |
| o-Xylene | 2.474E-03 | 2.474E-03 | QN | QN | ON | ND | QN |
| 4-Ethyltoluene | 2.214E-03 | 2.214E-03 | QN | QN | ON | ND | Q |
| 1,3,5-Trimethylbenzene | 2.460E-03 | 2.460E-03 | QV | Q | QN | QN | QN. |
| 1,2,4-Trimethylbenzene | 2.312E-03 | 2.312E-03 | ON | QN | QN | QN | <u>Q</u> |
| Benzyl Chloride | 5.076E-03 | 5.076E-03 | QN | QN | QN | ND | <u>Q</u> |
| m-Dichlorobenzene | 3.366E-03 | 3.366E-03 | QN | QN | ON | QN | QN |
| p-Dichlorobenzene | 2.945E-03 | 2.945E-03 | QN | QN | QN | QN | <u>Q</u> |
| o-Dichlorobenzene | 3.606E-03 | 3.606E-03 | ON | Q | DN | QN | QN |
| 1,2,4-Trichlorobenzene | 4.526E-03 | 4.526E-03 | QN | Q | Z QN | ND | ON |
| Hexachlorobutadlene | 4.690E-03 | 4.690E-03 | 2 | 2 | ON | ND | QN |
| Methane | 3.094E+00 | 1.364E+00 | 2.102E-02 | 3.539E-03 | 9.534E+00 | 6.936E-04 | 4.767E+00 |
| Ethane | 6.764E-01 | 6.764E-01 | QN | QN | . ON | QN | QN |
| Ethylene | 6.310E-01 | 6.310E-01 | QN | QN | QN | QN | Q |
| Propane | 9.920E-01 | 9.920E-01 | QN | QN | ON | QN | QN |
| Acetylene | 5.858E-01 | 5.858E-01 | ND | QN | QN | ND | QV |
| Isobutane | 1.307E+00 | 1.307E+00 | QN | Q | ON | QN | QN |
| n-Butane | 1.307E+00 | 1.307E+00 | Q | 9 | ON | DN | Q |
| Propylene | 9.466E-01 | 9.466E-01 | ND | Q | ND | QN | QN |
| Footnotes: | | | | | | | |

Table B-23: Air Modeling Output Data for Semi-Volatile Organic Compounds - 100 meter location

| | 155mm | propelling charg | 155mm propelling charge M3 (zone 5), M199 cannon | 9 cannon | No. of rounds (I) | | rounds |
|-----------------------------|---|--|--|--|------------------------------|--|--|
| | | DOD | DODIC: D540 | | release duration (t): | 2 | 2 seconds |
| | ΘN | Net Explosive Weigh | osive Weight (NEW) in lbs. => | 5.94 | Unit Concentration (UC): | 1,455E-04 | 1.455E-04 (g/m³)/(g/s) |
| | | Number or SF6 Leak Rate D | Number of Items = 1 Leak Rate Dilution Factor => | 0.95 | | | |
| | | Torpie aks with | AC Hilligh Regerence | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (lb/item) EF | Average Adjusted Emission Factor (Ib/Ib NEW) | Emitted (grams/item) M | Concentration for One Round (grams/m³) CONC | Emission Rate for One Round (g/sec) ER, |
| SVOCs | | | | | | | |
| n-nitrosodimethylamine | 2.577E-03 | 5.605E-05 | Q | Q. | QN | Q | Q |
| bis(2-chloroethyl)ether | 2.577E-03 | 5.605E-05 | . QN | QN | QN | S | Q. |
| phenol | 1.025E-02 | 7.120E-03 | 3.806E-05 | 6.407E-06 | 1.726E-02 | 1.256E-06 | 8.632E-03 |
| 2-chlorophenol | 2.577E-03 | 5.605E-05 | QN | QN | ON | ND | ON |
| 1,3-dichlorobenzene | 2.577E-03 | 5.605E-05 | QN | QN | ND | ND | QN |
| 1,4-dichlorobenzene | 2.577E-03 | 5.664E-05 | ON | QN | ND | ND | QN. |
| 1,2-dichlorobenzene | 2.577E-03 | 5.605E-05 | QN | QN | ND | ON | S |
| benzyl alcohol | 2.577E-03 | 5.605E-05 | QN | QN | QN | QN | 2 |
| bis(2-chlorolsopropyl)ether | 2,577E-03 | 5.605E-05 | QN. | QN | ND | QN | QN |
| 2-methylphenol | 2.577E-03 | 5.605E-05 | 9 | QV | ON | ON | QN |
| hexachloroethane | 2.577E-03 | 5.605E-05 | QN | ΩN | ND | ND | QN |
| n-nitroso-dl-n-propylamine | 2.577E-03 | 5.605E-05 | QN | QN | ON | QN | Q |
| 4-methylphenol | 2.577E-03 | 5.605E-05 | ON | QN | ND | QN | QN |
| nltrobenzene | 2.577E-03 | 5.605E-05 | QN | S | ND | ON | QN |
| Isophorone | 2.577E-03 | 5.605E-05 | QN | QN | ON | ND | QN |
| 2-nitrophenol | 2.577E-03 | 3.660E-04 | 2 | S | ON | QN | QN |
| 2,4-dimethylphenol | 2.577E-03 | 5.605E-05 | 2 | S | ND | QN | ON |
| bis(2-chloroethoxy)methane | 2.577E-03 | 5.605E-05 | QN | Q | ND | QN | QN |
| 2,4-dichlorophenol | 2.577E-03 | 5.605E-05 | QN | ΩN | QN | ND | QN |
| 1,2,4-trichlorobenzene | 2,577E-03 | 5.605E-05 | Q | QN | ΩN | ND | ΩN |
| naphthalene | 2.205E-03 | 1.366E-04 | 2.513E-05 | 4.231E-08 | 1.140E-02 | 8.293E-07 | 5.699E-03 |
| 4-chloroanlline | 2.577E-02 | 5.605E-04 | QN | QN | ON | QN | QN |
| hexachlorobutadiene | 2.577E-03 | 5.605E-05 | QN | 2 | ND | ND | QN |
| 4-chloro-3-methylphenol | 2.577E-03 | 5.605E-05 | Q | QN | ND | ND | ON |
| 2-methylnaphthalene | 2.577E-03 | 1.694E-04 | QV | QN | ND | ND | QN |
| hexachlorocyclopentadiene | 2.577E-03 | 5.605E-05 | QN | QN | ON | ND | QN |
| 2,4,6-trichlorophenol | 2.577E-03 | 5.605E-05 | QN | QN | QN | 2 | QN |

Table B-23: Air Modeling Output Data for Semi-Volatile Organic Compounds - 100 meter location

| | 155mm | propelling charge DODI | 155mm propelling charge M3 (zone 5), M199 cannon DODIC: D540 | 9 cannon | No. of rounds (I) release duration (I): | 1 | 1 rounds 2 seconds |
|----------------------------|---|--|---|--|---|--|--|
| | e N | Net Explosive Weigh Number o SF6 Leak Rate D | losive Weight (NEW) in lbs. => Number of Items = 1 Leak Rate Dilution Factor => | 5,94 0.95 | Unit Concentration (UC): | 1,455E-04 | 1.455E-04 (g/m³)/(g/s) |
| | | 300 | Alling the free collection | The second secon | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (Ib/Item) EF | Average Adjusted Emission Factor (Ib/lb NEW) | Emitted (grams/item) M | Concentration for One Round (grams/m³) CONC | Emission Rate for One Round (g/sec) ER, |
| 2,4,5-trichlorophenol | 2.577E-03 | 5.605E-05 | QN | ΩN | QN | QN | QN |
| 2-chloronaphthalene | 2.577E-03 | 5.605E-05 | ΩN | Q | QN | Q | Q |
| 2-nitroaniline | 2.577E-03 | 5.605E-05 | ΩN | QN | QN | 2 | QN |
| dimethylphthalate | 2.577E-03 | 5.605E-05 | QN | QN | ON | QN | QN |
| 2,6-dinitrotoluene | 2.577E-03 | 5.721E-05 | Q | Q | QN | ON | QN |
| 3-nitroaniline | 5.155E-03 | 1.121E-04 | Q | QN | QN | ON | QN |
| 2,4-dinltrophenol | 5.155E-03 | 1.121E-04 | QN | QN | ND | ND | QN |
| dibenzofuran | 2.577E-03 | 7.823E-05 | QN | Q | QN | ON | 2 |
| 2,4-dinitrotoluene | 2.577E-03 | 5.605E-05 | S | QN | QN | QN | S |
| 4-nitrophenol | 5.155E-03 | 1.316E-04 | ON | QN | QN | ND | QN |
| 4-chlorophenyl-phenylether | 2.577E-03 | 5.605E-05 | Q | Q | DN | QN | QN |
| diethylphthalate | 2.577E-03 | 5.605E-05 | Q | QN | QN | QN | QN |
| 4-nitroaniline | 5.155E-03 | 1.121E-04 | S | QN N | ND | QN | QN |
| 4,6-dinitro-2-methylphenol | 5.155E-03 | 1.121E-04 | Q | Q | ND | ON | QN |
| n-nitrosodiphenylamine(1) | 2.577E-03 | 5.605E-05 | Q | Q | QN | QN | QN |
| 4-bromophenyl-phenylether | 2.577E-03 | 5.605E-05 | Q | Q | QN | QN | ΩN |
| hexachlorobenzene | 2.577E-03 | 5.605E-05 | S | QN | QN | QN | QN |
| pentachlorophenol | 5.155E-03 | 1,121E-04 | QN | Q | QN | QN | QN |
| di-n-butylphthalate | 2.577E-03 | 1.080E-04 | ND | QN | QN | Q. | QN |
| butyibenzyiphthalate | 2.577E-03 | 5.605E-05 | DN | QN | QN | ON | QN |
| bis(2-ethylhexyl)phthalate | 8,448E-02 | 9.023E-04 | 1.015E-03 | 1.709E-04 | 4.606E-01 | 3.351E-05 | 2.303E-01 |
| di-n-octylphthalate | 2.577E-03 | 5.605E-05 | QN | QN | GN | QN ON | QN |
| Footnotes: | | | | | | | |

ootnotes:

Table B-24: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases 100 meter location

| | | | | | *** | , | |
|------------------------|-------------------------------|--|--|--|--------------------------|-----------------|--------------------------------|
| | 155mm prop | propelling charge | elling charge M3 (zone 5), M199 cannon | 9 cannon | No. of rounds (1) | - | rounds |
| | | idod | DODIC: D540 | | release duration (t): | 2 | seconds |
| | Ne | Net Explosive Weight (NEW) in Ibs. | t (NEW) in lbs. => | 5.94 | Unit Concentration (UC): | 1,455E-04 | 1.455E-04 (g/m³)/(g/s) |
| | | Number | Number of Items = 1 | | | | |
| | | SF6 Leak Rate Dilution Factor | ilution Factor => | 0.95 | | | |
| | | कार के के किया है। जिस्से के किया के किया किया किया किया किया किया किया किया | 900000000 | The second secon | Total Mass of Substance | Average Modeled | Substance Emission Pate for |
| | or the A | Measured | Average Adjusted | potential A decrease | Emilited (grams/Item) | One Round | One Round |
| Compound | Measured Actual Concentration | Background | Emission Factor | Emission Factor | | (grams/m³) | (bes/b) |
| | (mg/m³) | (mg/m³) | (IDANGIN) EF | (Ib/Ib NEW) | Σ | CONC | ER, |
| PAHs (TO-13 Method) | | | | ٠ | | | |
| acenaphthylene | 2.760E-04 | 1.328E-06 | 3.337E-06 | 5.618E-07 | 1.514E-03 | 1.101E-07 | 7.568E-04 |
| acenaphthene | 8.752E-05 | 9.544E-05 | <u>Q</u> | QN | ON | ᄝ | 2 |
| fluorene | 2.120E-04 | 6.502E-05 | 1.786E-06 | 3.007E-07 | 8.101E-04 | 5.894E-08 | 4.051E-04 |
| phenanthrene | 4.889E-04 | 6.428E-05 | 5.159E-06 | 8.685E-07 | 2.340E-03 | 1.702E-07 | 1.170E-03 |
| anthracene | 5.970E-05 | 4.197E-06 | 6.743E-07 | 1.135E-07 | 3.058E-04 | 2.225E-08 | 1.529E-04 |
| fluoranthene | 3,011E-04 | 7.852E-06 | 3.563E-06 | 5.998E-07 | 1.616E-03 | 1.176E-07 | 8.081E-04 |
| pyrene | 9.009E-04 | 6.908E-06 | 1.086E-05 | 1.829E-06 | 4.927E-03 | 3.584E-07 | 2.463E-03 |
| benzo(a)anthracene | 5.147E-05 | 1.390E-07 | 6.236E-07 | 1.050E-07 | 2.829E-04 | 2.058E-08 | 1.414E-04 |
| chrysene | 5.560E-05 | 3.878E-07 | 6.708E-07 | 1.129E-07 | 3.043E-04 | 2.214E-08 | 1.521E-04 |
| benzo(b)fluoranthene | 1.001E-04 | 2.220E-07 | 1.213E-06 | 2.042E-07 | 5.501E-04 | 4.002E-08 | 2.751E-04 |
| benzo(k)fluoranthene | 1.311E-04 | 9.826E-08 | 1.592E-06 | 2.680E-07 | 7.221E-04 | 5,254E-08 | 3.611E-04 |
| benzo(a)pyrene | 1.833E-04 | 8.980E-08 | 2.226E-06 | 3.747E-07 | 1.010E-03 | 7.345E-08 | 5.048E-04 |
| Indeno(1,2,3-cd)pyrene | 2.940E-04 | 1.659E-07 | 3.570E-06 | 6.010E-07 | 1.619E-03 | 1.178E-07 | 8.096E-04 |
| dibenz(a.h)anthracene | 9.271E-06 | 5.605E-08 | 1.126E-07 | 1.896E-08 | 5.109E-05 | 3.717E-09 | 2.554E-05 |
| benzo(q,h,l)perylene | 7.054E-04 | 2.408E-07 | 8.566E-06 | 1.442E-06 | 3.886E-03 | 2.827E-07 | 1.943E-03 |
| Dioxin/Furan Data | | | | | | | |
| 2378-TCDD | 8.448E-09 | 8.000E-12 | 1.026E-10 | 1.728E-11 | 4.655E-08 | 3.387E-12 | 2.328E-08 |
| 12378-PECDD | 1.185E-09 | 9.000E-12 | 1,429E-11 | 2.405E-12 | 6.480E-09 | 4.714E-13 | 3.240E-09 |
| 123478-HXCDD | 6.655E-10 | 1.050E-11 | QN | ON | ND | QV | <u>Q</u> |
| 123678-HXCDD | 3,434E-09 | 1.700E-11 | 4.151E-11 | 6.989E-12 | 1.883E-08 | 1.370E-12 | 9.415E-09 |
| 123789-HXCDD | 1.261E-09 | 1.550E-11 | 1.513E-11 | 2.546E-12 | 6.861E-09 | 4.991E-13 | 3.430E-09 |
| 1234678-HPCDD | 2.972E-08 | 2.495E-10 | 3.580E-10 | 6.027E-11 | 1.624E-07 | 1.181E-11 | 8.120E-08 |
| OCDD | 1.730E-07 | 1.587E-09 | 2.082E-09 | 3.505E-10 | 9.444E-07 | 6.870E-11 | 4.722E-07 |
| 2378-TCDF | 3.725E-09 | 1.100E-11 | 4.511E-11 | 7.595E-12 | 2.046E-08 | 1,489E-12 | 1.023E-08 |
| 12378-PECDF | 3.500E-09 | 1.050E-11 | 4.239E-11 | 7.137E-12 | 1.923E-08 | 1.399E-12 | 9.614E-09 |
| 23478-PECDF | 1.641E-09 | 1.550E-11 | 1.975E-11 | 3.325E-12 | 8.957E-09 | 6.516E-13 | 4,479E-09 |
| 123478-HXCDF | 2.772E-09 | 2.800E-11 | 3.334E-11 | 5.612E-12 | 1.512E-08 | 1.100E-12 | 7.560E-09 |
| 123678-HXCDF | 1.185E-09 | 1.450E-11 | 1.422E-11 | 2.394E-12 | 6.450E-09 | 4.692E-13 | 3.225E-09 |
| 123789-HXCDF | 3.800E-10 | 6.000E-12 | QN | QN | ON | QN | 2 |
| | | | | | | | |

Table B-24: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases 100 meter location

| וסחוופופו וספווסוו | | | | | | | |
|--------------------------|--------------------------|------------------------------------|---|--------------------------------|--------------------------|-----------------------------|--------------------------------|
| | 155mm pro | propelling charge | pelling charge M3 (zone 5), M199 cannon | 9 cannon | No. of rounds (I) | 1 | rounds |
| | | DOD | DODIC: D540 | | release duration (t): | 2 | seconds |
| | θN | Net Explosive Weight (NEW) in Ibs. | t (NEW) in lbs. => | 5.94 | Unit Concentration (UC): | 1,455E-04 | 1.455E-04 (g/m³)/(g/s) |
| | | Number (| Number of Items = 1 | | | | |
| | | SF6 Leak Rate Dilution Factor | ilution Factor => | 0.95 | | | |
| | | | Medicing Mine on the | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual | Measured | Average Adjusted | Average Adjusted | Emitted (grams/item) | Concentration for One Round | Emission Kate for One Round |
| | Concentration (mg/m³) | Concentration (mg/m³) | (lb/ltem) EF | Emission Factor (lb/lb NEW) | Σ | (grams/m²) CONC | (g/sec) ER ₁ |
| 234678-HXCDF | 1.157E-09 | 1.200E-11 | 1.391E-11 | 2.342E-12 | 6.310E-09 | 4.590E-13 | 3.155E-09 |
| 1234678-HPCDF | 1.244E-08 | 7.750E-11 | 1.502E-10 | 2.529E-11 | 6.814E-08 | 4.957E-12 | 3.407E-08 |
| 1234789-HPCDF | 5.860E-10 | 8.000E-12 | 7.022E-12 | 1.182E-12 | 3.185E-09 | 2.317E-13 | 1.593E-09 |
| OCDF | 7.895E-09 | 1.105E-10 | 9.457E-11 | 1.592E-11 | 4.290E-08 | 3.121E-12 | 2.145E-08 |
| Aldehydes | | | | | | | |
| Formaldehyde | 1.228E-02 | 1.228E-02 | ON | QN | QN | QN | Q |
| Acetaldehyde | 1.802E-02 | 1.802E-02 | QN | QN | QN | Q | QN |
| Acetone | 2.375E-02 | 4.751E-02 | ON | QN | QN | QN | QV. |
| Acrolein | 2.294E-02 | 2.294E-02 | ON | QN | QN | QN | QN |
| Proprionaldehyde | 2.374E-02 | 2.374E-02 | ON | QN | QN | 9 | Q |
| Crotonaldehyde | 2.867E-02 | 2.867E-02 | QN | QN | QN | QN | QN. |
| Butyraldehyde | 2.949E-02 | 2.949E-02 | 2 | QN | ND | ND | QN. |
| Benzaldehyde | 4.340E-02 | 4.340E-02 | QN | QN | QN | ND | 2 |
| Isovaleraldehyde | 3.523E-02 | 3.523E-02 | 2 | Q | ON | QN | 2 |
| Valeraldehyde | 3.523E-02 | 3.523E-02 | QN | QN | ND | . ND | Q. |
| o,m,p-Tolualdehyde | 1.474E-01 | 9.828E-02 | 2 | Q | QN | QN | QN |
| Hexaldehyde | 4.097E-02 | 4.097E-02 | Q | 2 | QN | ND | QN |
| 2,5-Dimethylbenzaldehyde | 4.097E-02 | 4.097E-02 | <u>Q</u> | 2 | QN | ND | ON |
| Acid gases | | | | | | | |
| Hydrogen fluoride | 1.400E-01 | 1.400E-01 | Q | 2 | QN | QN . | QN |
| Hydrogen chloride | 1.300E-01 | 1.300E-01 | QN | QN | ON | ND | QN |
| Hydrogen bromide | 1.400E-01 | 1.400E-01 | Q | ND P | ON | QN | 9 |
| Nitric Acid | 1.400E-01 | 1.400E-01 | Q. | Q | QN | Q | Q. |
| Phosphoric acid | 1.400E-01 | 1,400E-01 | QN | QN | QN | QN | Q. |
| Sulfuric Acid | 1.400E-01 | 1.400E-01 | QN | QN | QN | ND | QN |
| Footpotes. | | | | | | | |

¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected -ootnotes:

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Table B-25: Air Modeling Output Data for Cyanide and Energetics - 100 meter location

| | 155mm | propelling charge DODI | 155mm propelling charge M3 (zone 5), M199 cannon DODIC: D540 | 9 cannon | No. of rounds (I) release duration (t): | 1 | 1 rounds 2 seconds |
|-----------------------------|---|---------------------------------|--|--|--|--|--|
| | δ Z | Net Explosive Weigh Number o | losive Weight (NEW) in ibs. => Number of Items = 1 I eak Rate Dilution Factor => | 5.94 | Unit Concentration (UC): | 1,455E-04 | 1.455E-04 (g/m³)/(g/s) |
| | The second second | 1966 | 1 | Samuel Commence of the samuel of | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | 2 9 7 | Average Adjusted Emission Factor (Ib/Item) EF | Average Adjusted Emission Factor (Ib/lb NEW) | Emitted (grams/item) M | Concentration for One Round (grams/m³) CONC | Emission Rate for One Round (g/sec) ER ₁ |
| Particulate Cyanide and HCN | | | | • | | | |
| Particulate Cyanide | 1.200E-01 | 8.000E-02 | 1.458E-03 | 2.454E-04 | 6.613E-01 | 4.811E-05 | 3.306E-01 |
| Hydrogen Cyanide | 1.650E+00 | 8.500E-02 | 2.005E-02 | 3.375E-03 | 9.092E+00 | 6.615E-04 | 4.546E+00 |
| Energetics Data | | | | | | | |
| Nitrobenzene | 4.819E-01 | 2.031E-01 | QN | QN | QN | QN | QN |
| 2-Nitrotoluene | 4.819E-01 | 2.031E-01 | QN | QN | ND | ND | QN |
| 3-Nitrotoluene | 4.819E-01 | 2.031E-01 | ND | QN | QN | QN | QN |
| 4-Nitrotoluene | 4.819E-01 | 2.031E-01 | QN | GN | ND | ND | ΩN |
| Nitroglycerine | 4.819E-01 | 2.031E-01 | ON | ΩN | QN | QN | Q |
| 1,3-Dinitrobenzene | 4.819E-01 | 2.031E-01 | QN | QN | QN | QN | 2 |
| 2,6-Dinitrotoluene | 4.819E-01 | 2.031E-01 | QN | QN | QN | QN | Q |
| 2,4-Dinitrotoluene | 4.819E-01 | 2.031E-01 | QN | QN | QN | QN | 9 |
| 1,3,5-Trinltrobenzene | 4.819E-01 | 2.031E-01 | QN | QN | ND | QN | QN |
| 2,4,6-Trinitrotoluene | 4.819E-01 | 2.031E-01 | ΩN | · QN | ND | ND | QN |
| RDX | 4.819E-01 | 2.031E-01 | S | Q | ND | ND | QN |
| 4-Amino-2,6-Dinitrotoluene | 4.819E-01 | 2.031E-01 | Q | Q | ND | ND | QN |
| 2-Amino-4,6-Dinitrotoluene | 4.819E-01 | 2.031E-01 | QN | QN | QN | ND | QN |
| Tetryl | 4.819E-01 | 2.031E-01 | Q | QN O | QN | ND | QN |
| HMX | 9.639E-01 | 4.062E-01 | QN | QV | QN | ND | QN |
| Pentaerythritoltetranitrate | 9.639E-01 | 4.062E-01 | ON. | QN | ND | ND | QN |
| Dibutyl phthalate | 2.410E+01 | 1.016E+01 | QN | Q | ND | ND | ON |
| Dioctyl phthalate | 2.410E+01 | | QN. | Q | QN | ND | QN |
| Diphenylamine | 1.205E+01 | 5.078E+00 | ND | ND | ND | ND | QN |

Footnotes:

AIR MODELING OUTPUT DATA FOR CHARGE M3, FIRED FROM THE M199 CANNON, ZONE 5, 200 METERS DOWNWIND

Table B-26: Air Modeling Output Data for Gases, Metals, and Particulates - 200 meter location

| | 155mm | propelling charge | 155mm propelling charge M3 (zone 5), M199 cannon DODIC: D540 | 9 cannon | No. of rounds (I) | 1 | |
|----------------------|---|--|---|--|------------------------------|--|--|
| | Ž | Net Explosive Weight (NEW) in lbs. | (NEW) In Ibs. => | 5.94 | Unit Concentration (UC): | 6.505E-05 | 6.505E-05 (n/m³)/(n/s) |
| | | Number of items = 1 SF6 Leak Rate Dilution Factor | Number of items = 1 sk Rate Dilution Factor => | 0.95 | | | (c,8) (8) |
| | 1300 - Wall | the stabilities of | An section | A service a mandam different at men | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (Ib/Item) EF | Average Adjusted Emission Factor (lb/lb NEW) | Emitted (grams/item) M | Concentration for One Round (grams/m³) CONC | Emission Rate for One Round (g/sec) ER, |
| Gases | | | | | | | |
| NH3 | 8.400E+00 | AN | 9.695E-02 | 1.632E-02 | 4.397E+01 | 7.151E-04 | 1.099E+01 |
| coz | 1.080E+02 | NA | 1.246E+00 | 2.098E-01 | 5.654E+02 | 9.194E-03 | 1.413E+02 |
| CO | 2.841E+02 | NA | 3.278E+00 | 5.519E-01 | 1,487E+03 | 2.418E-02 | 3.717E+02 |
| NOx (as NO) | 3.936E+00 | NA | 4.543E-02 | 7.647E-03 | 2.060E+01 | 3.351E-04 | 5,151E+00 |
| CH4 | 2.178E+00 | NA | QN | QN | QN | 2 | 9 |
| 802 | 5.240E-01 | NA | QN | QN | QN | 2 | 9 |
| Combined Particulate | | | | | | | |
| TSP | 1.122E+01 | 5.300E-02 | 1.356E-01 | 2.284E-02 | 6.153E+01 | 1.001E-03 | 1.538E+01 |
| PM10 | 8.017E+00 | 4.233E-02 | 9.688E-02 | 1.631E-02 | 4.394E+01 | 7.146E-04 | 1.099E+01 |
| PM2.5 | 3,180E+00 | 2.400E-02 | 3.834E-02 | 6.455E-03 | 1.739E+01 | 2.828E-04 | 4.348E+00 |
| Metais | | | | | | | |
| Antimony | 2.819E-04 | 4.345E-06 | 3.371E-06 | 5.676E-07 | 1.529E-03 | 2.487E-08 | 3.823E-04 |
| Arsenic | 6.180E-04 | 3.091E-06 | 7.470E-06 | 1.258E-06 | 3.388E-03 | 5,510E-08 | 8.471E-04 |
| Barium | 6.071E-03 | 3.255E-05 | 7.336E-05 | 1.235E-05 | 3.327E-02 | 5.411E-07 | 8.319E-03 |
| Beryllium | 7.806E-05 | 1.649E-06 | QN | QN | QN | S | Q |
| Cadmium | 2.103E-04 | 1.649E-06 | 2.555E-06 | 4.301E-07 | 1.159E-03 | 1.885E-08 | 2.897E-04 |
| Chromium | 1.334E-03 | 7.167E-06 | 1.611E-05 | 2.713E-06 | 7.309E-03 | 1.189E-07 | 1.827E-03 |
| Cobalt | 1.713E-04 | 3.763E-06 | 2.035E-06 | 3.426E-07 | 9.231E-04 | 1.501E-08 | 2.308E-04 |
| Copper | 1.518E+00 | 1.159E-03 | 1.842E-02 | 3.102E-03 | 8,357E+00 | 1.359E-04 | 2.089E+00 |
| Lead | 3.036E-02 | 6.770E-05 | 3.680E-04 | 6.195E-05 | 1.669E-01 | 2.714E-06 | 4.173E-02 |
| Manganese | 7.480E-03 | 3.086E-05 | 9.050E-05 | 1.524E-05 | 4.105E-02 | 6.676E-07 | 1.026E-02 |
| Nickel | 2.494E-03 | 1.433E-05 | 3,012E-05 | 5.071E-06 | 1.366E-02 | 2.22E-07 | 3.415E-03 |
| Selenium | 2.602E-04 | 5.497E-06 | QN | QN | QN | ON | Q. |
| Silver | 1.019E-04 | 1.099E-06 | 1.238E-06 | 2.084E-07 | 5.615E-04 | 9.132E-09 | 1.404E-04 |
| Thallium | 7.806E-05 | 1.613E-06 | 2 | S | ON | QN | S |
| Zinc | 2.385E-01 | 1,445E-04 | 2.896E-03 | 4.875E-04 | 1.314E+00 | 2.136E-05 | 3.284E-01 |
| Footnotes: | e d | | | | | | |

Table B-27; Air Modeling Output Data for Volatile Organic Compounds - 200 meter location

| | | | | | 11) At 2 - 14 | 7 | 000000 |
|---------------------------------------|----------------------------------|-------------------------------------|---|-------------------------------------|--------------------------|-------------------------|--|
| | 155mm p | propelling charge DODIG | 155mm propelling charge M3 (zone ၁), พาษ9 cannon DODIC: D540 | e cannon | release duration (t): | - 4 | seconds |
| | Ne | Net Explosive Weight | osive Weight (NEW) in lbs. => | 5.94 | Unit Concentration (UC): | 6.505E-05 | 6.505E-05 (g/m³)/(g/s) |
| | | | | 1 | | | |
| | | SF6 Leak Rate D | Leak Rate Dilution Factor => | 0.95 | | | |
| | | HALL SECTION OF THE SECTION SECTION | | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background | Average Adjusted Emission Factor | Average Adjusted Emission Factor | Emirted (grams/item) | One Round (grams/m³) | Cinission rate for One Round (g/sec) |
| | (mg/m ₃) | Concentration (mg/m³) | (ID/Item) EF | (Ib/Ib NEW) | Σ | CONC | ER, |
| VOCs | | | | | | | |
| Dichlorodifluoromethane | 3.762E-03 | 3.762E-03 | QN | QN | ON | ND | QN |
| Methyl Chloride | 1.594E-03 | 1.594E-03 | 9 | QN | QN | ND | QN |
| Dichlorotetrafluoroethane | 4.683E-03 | 4.683E-03 | QN | QN | ND | QN | ON |
| Vinyi Chloride | 5.069E-03 | 5.069E-03 | QN | QN | ND | Q. | 2 |
| 1,3-Butadlene | 1.790E-03 | 1.790E-03 | Q | Q | QN | QV | Q |
| Methyl Bromide | 3.073E-03 | 3.073E-03 | 2 | Q | QN | Q | 9 |
| Ethyl Chloride | 2.112E-03 | 2.112E-03 | Q | Q | QN | QN | Q |
| Trichtorofluoromethane | 3.934E-03 | 3.934E-03 | Q | Q | ΩN | QN | Q |
| 1,1-Dichloroethene | 9.184E-03 | 6.696E-03 | 3.023E-05 | 5.090E-06 | 1.371E-02 | 2.230E-07 | 3.429E-03 |
| Dichloromethane | 1.519E-01 | 5.722E-03 | 1.776E-03 | 2.989E-04 | 8.054E-01 | 1.310E-05 | 2.014E-01 |
| 3-Chloropropene | 2.754E-03 | 2,754E-03 | QN | Q | QN | Q | QN |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 4.752E-03 | 5.750E-03 | ON | QN | ΩN | 2 | Q |
| 1,1-Dichloroethane | 3.159E-03 | 3.159E-03 | QN | QN | ND | QN | S |
| cls-1,2-Dichloroethene | 3.295E-03 | 3.295E-03 | QN | QN | ND | QN | Q |
| Trichloromethane | 4.099E-03 | 4.099E-03 | QN | QN | ND | 2 | QN |
| 1,2-Dichtoroethane | 3.443E-03 | 3.443E-03 | ΩN | QN | QN | QN | S |
| 1,1,1-Trichloroethane | 2.070E-02 | 1.095E-01 | S | QN | QN | QN | QN |
| Вепzепе | 7.375E-02 | 2.329E-03 | 8.959E-04 | 1.508E-04 | 4.064E-01 | 6.609E-06 | 1,016E-01 |
| Carbon Tetrachloride | 4.529E-03 | 4.529E-03 | Q | 9 | QN | QN | Q |
| 1,2-Dichloropropane | 3.419E-03 | 3.419E-03 | S | Q | QN | QN | Q |
| Trichioroethene | 3.866E-03 | 3.866E-03 | Q | <u>Q</u> | QN | Q | QQ |
| cis-1,3-Dichloropropene | 3.360E-03 | 3.360E-03 | QN | Q | QN | QN | QN |
| trans-1,3-Dichloropropene | 2.860E-03 | 2.860E-03 | S | 2 | QN | QN | QN |
| 1,1,2-Trichloroethane | 3.877E-03 | 3.877E-03 | ND | Q. | QN | ΩN | QN |
| Toluene | 5,655E-03 | 3.610E-03 | 2,485E-05 | 4.183E-06 | 1.127E-02 | 1.833E-07 | 2.818E-03 |
| 1,2-Dibromoethane | 5.844E-03 | 5.844E-03 | Q | Q | QN | QN | Q |
| Tetrachioroethene | 4.475E-03 | 4.475E-03 | QN | QN | QN | QN | Q |

Table B-27: Air Modeling Output Data for Volatile Organic Compounds - 200 meter location

| | 155mm | propelling charge DODI | 155mm propelling charge M3 (zone 5), M199 cannon DODIC: D540 | 9 cannon | No. of rounds (I) release duration (t): | 1 4 | rounds |
|---------------------------|--------------------------|---|--|---------------------------------|---|--------------------------------|--------------------------------|
| | δ | Net Explosive Weight (NEW) in ibs Number of items = 1 SF6 Leak Rate Dilution Factor | plosive Weight (NEW) in lbs. => Number of items = 1 6 Leak Rate Dilution Factor => | 5.94 | Unit Concentration (UC): | 6.505E-05 | 6.505E-05 (g/m³)/(g/s) |
| | | Mark filener stillation | 18.14.2.116 | La markhan tach Alban hallannan | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual | Measured | Average Adjusted | Average Adjusted | Emitted (grams/item) | Concentration for One Round | Emission Rate for One Round |
| • | Concentration (mg/m³) | Concentration (mg/m³) | (lb/ltem) EF | Emission Factor (Ib/Ib NEW) | Ż | (grams/m³) CONC | (g/sec) ER ₁ |
| Chlorobenzene | 2.305E-04 | 2.305E-04 | QN | ΩN | Q | QN | QN |
| Ethylbenzene | 2.344E-03 | 2.344E-03 | QN | QN | QN | QN | 2 |
| m&p-Xylene | 2.257E-03 | 2.257E-03 | QN | QN | QN | QN | QN |
| Styrene | 2.641E-03 | 2.641E-03 | QN | QN | QN | ND | 2 |
| 1,1,2,2-Tetrachioroethane | 4.466E-03 | 4.466E-03 | QN | ON | QN | S | 2 |
| o-Xylene | 2.474E-03 | 2.474E-03 | QN | QN | QN | S | 2 |
| 4-Ethyltoluene | 2.214E-03 | 2.214E-03 | QN | QN | QN | QV. | QN |
| 1,3,5-Trimethylbenzene | 2.460E-03 | 2.460E-03 | QN | QN | QN | QN | Q |
| 1,2,4-Trimethylbenzene | 2.312E-03 | 2.312E-03 | QN | ON | QN | QN | QN |
| Benzyl Chloride | 5.076E-03 | 5.076E-03 | Q | QN | QN | QN | QN |
| m-Dichlorobenzene | 3.366E-03 | 3.366E-03 | Q | Q. | ND | QN | Q |
| p-Dichlorobenzene | 2.945E-03 | 2.945E-03 | ΩN | S | ON | QN | QN |
| o-Dichlorobenzene | 3.606E-03 | 3.606E-03 | Q | Q | ND | QN | Q |
| 1,2,4-Trichiorobenzene | 4.526E-03 | 4.526E-03 | 2 | Q | ND | ND | QN |
| Hexachiorobutadiene | 4.690E-03 | 4.690E-03 | 2 | 2 | ON | ND | QN |
| Metnane | 3.094E+00 | 1.364E+00 | 2.102E-02 | 3.539E-03 | 9.534E+00 | 1.550E-04 | 2.384E+00 |
| Etnane | 6.764E-01 | 6.764E-01 | 2 | 9 | QN | ND | QN |
| Ethylene | 6.310E-01 | 6.310E-01 | QN | S | QN | ON | 9 |
| Propane | 9.920E-01 | 9.920E-01 | 잎 | S | QN | Q. | QN |
| Acetylene | 5.858E-01 | 5.858E-01 | QN | QN | QN | 9 | S |
| Isobutane | 1.307E+00 | 1.307E+00 | Q | QN | QN | S | QN |
| n-Butane | 1.307E+00 | 1.307E+00 | Q. | QN | QN | S | 9 |
| Propylene | 9.466E-01 | 9.466E-01 | ND | ND | QN | ND | QN |
| Footnotes: | | | | | | | |

¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

Table B-28: Air Modeling Output Data for Semi-Volatile Organic Compounds - 200 meter location

| | 155mm nrone | propelling charge | lling charge M3 (zone 5). M199 cannon | 9 cannon | No. of rounds (1) | | rounds |
|-----------------------------|----------------------------------|---|--|----------------------------------|--------------------------|-------------------------|---|
| | | laoa | DODIC: D540 | | release duration (t): | 4 | seconds |
| | S | Net Explosive Weigh | osive Weight (NEW) in lbs. => | 5.94 | Unit Concentration (UC): | 6.505E-05 | 6.505E-05 (g/m³)/(g/s) |
| | | Number | Number of Items = 1 | | | | |
| | | ~ | Leak Rate Difution Factor => | 0.95 | | | |
| | Action of the Carlotte and | et akudoja fe | SECTION CONSEQUE | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background Concentration | Average Adjusted Emission Factor (lb/item) | Average Adjusted Emission Factor | Emitted (grams/Item) | One Round (grams/m³) | Chilssion Rate to One Round (g/sec) |
| | (mg/m²) | (mg/m³) | T | (ID/ID INEW) | M | CONC | ER, |
| SVOCs | | | | | | | |
| n-nitrosodimethylamine | 2.577E-03 | 5.605E-05 | QN | QN | QN | ND | QN |
| bis(2-chloroethyl)ether | 2.577E-03 | 5.605E-05 | QN | QN | QN | ON | QN |
| phenol | 1.025E-02 | 7.120E-03 | 3.806E-05 | 6.407E-06 | 1.726E-02 | 2.808E-07 | 4.316E-03 |
| 2-chlorophenol | 2.577E-03 | 5.605E-05 | QN | QN | ND | S | Q |
| 1,3-dichlorobenzene | 2.577E-03 | 5.605E-05 | QN | QN | ND | NO. | Q |
| 1,4-dichlorobenzene | 2.577E-03 | 5.664E-05 | QN | QN | QN | QN | QN |
| 1,2-dichlorobenzene | 2.577E-03 | 5.605E-05 | ΩN | QN | QN | Q | QN |
| benzyl alcohol | 2.577E-03 | 5.605E-05 | ON | QN | QN | 2 | Q |
| bis(2-chlorolsopropyl)ether | 2.577E-03 | 5,605E-05 | QN | QN | ND | ON | QN. |
| 2-methylphenol | 2.577E-03 | 5.605E-05 | QN | QN | ON | QN | ON |
| hexachloroethane | 2.577E-03 | 5.605E-05 | ON | QN | QN | ON | ON |
| n-nitroso-di-n-propylamine | 2.577E-03 | | QN | QN | ND | QN | QN |
| 4-methylphenol | 2.577E-03 | 5.605E-05 | QN | QN | QN | QN | QN |
| nitrobenzene | 2.577E-03 | 5.605E-05 | QN | QN | QN | ON | ON |
| isophorone | 2.577E-03 | 5.605E-05 | QN | QN | ON | QN | QN |
| 2-nitrophenol | 2.577E-03 | 3.660E-04 | QN | QN | ND | QN | ON |
| 2,4-dimethylphenol | 2.577E-03 | | QN | Q | QN | Q. | Q. |
| bis(2-chloroethoxy)methane | 2.577E-03 | | QN | QN | ND | Q. | 2 |
| 2,4-dichlorophenol | 2.577E-03 | 5.605E-05 | ON | Q | ND | ᄝ | 2 |
| 1,2,4-trichlorobenzene | 2.577E-03 | | QN | Q | ND | S | ND |
| naphthalene | 2.205E-03 | 1.366E-04 | 2.513E-05 | 4.231E-06 | 1.140E-02 | 1.854E-07 | 2.850E-03 |
| 4-chloroaniline | 2.577E-02 | 5.605E-04 | QN | QN | QN | QN | QN |
| hexachlorobutadiene · | 2.577E-03 | 5,605E-05 | ND | QN | QN | Q | Q |
| 4-chloro-3-methylphenol | 2.577E-03 | | QN | Q | Q | Q | QN |
| 2-methylnaphthalene | 2.577E-03 | 1,694E-04 | Q | Q | Q. | QN | QN |
| hexachlorocyclopentadlene | 2.577E-03 | 5.605E-05 | QN | Q | QN | ND ND | QN |
| 2,4,6-trichlorophenol | 2.577E-03 | 5.605E-05 | QN | QN | QN | QN | QN |
| | | | | | | | |

Table B-28: Air Modeling Output Data for Semi-Volatile Organic Compounds - 200 meter location

| | 155mm | propelling charge DODI | 155mm propelling charge M3 (zone 5), M199 cannon DODIC: D540 | 9 cannon | No. of rounds (!) release duration (t): | 1 | rounds |
|----------------------------|----------------------------------|--|---|--|---|--|---|
| | 8 | Net Explosive Weight (NEW) in Ibs. Number of Items = 1 SF6 Leak Rate Dilution Factor | /e Welght (NEW) in lbs. => Number of Items = 1 sk Rate Dilution Factor => | 5.94 | Unit Concentration (UC): | 6.505E-05 | 6.505E-05 (g/m³)/(g/s) |
| | | | | The state of the s | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background | Average Adjusted Emission Factor | Average Adjusted Emission Factor | Emitted (grams/item) | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) |
| · | (mg/m³) | Concentration (mg/m³) | (ib/item) EF | (Ib/Ib NEW) | Σ | CONC | ER, |
| 2,4,5-trichlorophenol | 2.577E-03 | 5.605E-05 | QN | QN | QN | QN | ΩN |
| 2-chloronaphthalene | 2.577E-03 | 5.605E-05 | QN | QN | QN | QN | QN |
| 2-nitroaniline | 2.577E-03 | 5.605E-05 | QN | QN | QN | QN | QN |
| dimethylphthalate | 2.577E-03 | 5.605E-05 | QN | QN | ON | ND | QN |
| 2,6-dinitrotoluene | 2.577E-03 | 5.721E-05 | Q | SD | QN | QN | <u>S</u> |
| 3-nitroaniline | 5.155E-03 | 1.121E-04 | QN | QN | QN | QN | QN |
| 2,4-dinitrophenol | 5.155E-03 | 1.121E-04 | QN | QN | QN | QN | QN |
| dibenzofuran | 2.577E-03 | 7.823E-05 | Q | S | GN | QN | Q |
| 2,4-dinitrotoluene | 2.577E-03 | 5.605E-05 | QN | QN | QN | QN | QV |
| 4-nitrophenol | 5,155E-03 | 1.316E-04 | Q | ND | QN | QN | Q |
| 4-chlorophenyl-phenylether | 2.577E-03 | 5.605E-05 | QN | QN | GN | QN | QN |
| diethylphthalate | 2.577E-03 | 5.605E-05 | QN | QN | ND | QN | QN |
| 4-nitroaniline | 5.155E-03 | 1.121E-04 | Q | QN | QN | ND | QN |
| 4,6-dinitro-2-methylphenol | 5.155E-03 | 1.121E-04 | 2 | Q | QN | QN | S |
| n-nitrosodiphenylamine(1) | 2.577E-03 | 5.605E-05 | QN | QN | QN | QN | QQ |
| 4-bromophenyi-phenylether | 2.577E-03 | 5.605E-05 | Q | QN | GN | ND | QN |
| hexachlorobenzene | 2.577E-03 | 5.605E-05 | Q | 2 | QN | QN | QN |
| pentachlorophenol | 5.155E-03 | 1.121E-04 | Q | S | QN · | QN | QN |
| di-n-butyiphthalate | 2.577E-03 | 1.080E-04 | QN | QN | QN | QN | QN |
| butylbenzyiphthalate | 2.577E-03 | 5.605E-05 | Q | ON | QN | QV | QV. |
| bis(2-ethylhexyl)phthalate | 8.448E-02 | 9.023E-04 | 1.015E-03 | 1.709E-04 | 4.606E-01 | 7.490E-06 | 1.151E-01 |
| di-n-octylphthalate | 2.577E-03 | 5.605E-05 | Q | ND | QN | QN | QN |
| Footnotes: | | | | | | | |

Table B-29: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases

| | 155mm prope | propelling charge | illing charge M3 (zone 5), M199 cannon | 9 cannon | No. of rounds (I) | - | rounds |
|------------------------|-----------------------|-----------------------------|--|--|--------------------------|-----------------|-----------------------------|
| | | IDOD | DODIC: D540 | | release duration (t): | 4 | seconds |
| | Ne | Net Explosive Welgh | osive Welght (NEW) in lbs. => | 5.94 | Unit Concentration (UC): | 6.505E-05 | 6.505E-05 (g/m³)/(g/s) |
| | | Number (| Number of Items = 1 | | | | |
| | | | Leak Rate Dilution Factor => | 0.95 | | | |
| | | | everyllillerselfer resolutions | The state of the s | Total Mass of Substance | Average Modeled | Substance |
| • | Measured Actual | Measured | Average Adjusted | Average Adiusted | Emitted (grams/item) | One Round | Emission kate for One Round |
| Compound | Concentration (mg/m³) | Background Concentration | Emission Factor (lb/item) | Emission Factor | | (grams/m³) | (ces/b) |
| | (mg/m) | (mg/m ₃) | A H | / | M | CONC | ER, |
| PAHs (TO-13 Method) | | | | • | | | |
| acenaphthylene | 2.760E-04 | 1.328E-06 | 3.337E-06 | 5.618E-07 | 1.514E-03 | 2.462E-08 | 3.784E-04 |
| acenaphthene | 8.752E-05 | 9.544E-05 | QN | QN | QN | ON | QN |
| fluorene | 2.120E-04 | 6.502E-05 | 1.786E-06 | 3.007E-07 | 8.101E-04 | 1,317E-08 | 2.025E-04 |
| phenanthrene | 4.889E-04 | 6.428E-05 | 5.159E-06 | 8.685E-07 | 2.340E-03 | 3,806E-08 | 5.850E-04 |
| anthracene | 5.970E-05 | 4.197E-06 | 6.743E-07 | 1.135E-07 | 3.058E-04 | 4.974E-09 | 7.646E-05 |
| fluoranthene | 3.011E-04 | 7.852E-06 | 3.563E-06 | 5.998E-07 | 1.616E-03 | 2.628E-08 | 4.040E-04 |
| pyrene | 9.009E-04 | 6.908E-06 | 1.086E-05 | 1.829E-06 | 4.927E-03 | 8.012E-08 | 1.232E-03 |
| benzo(a)anthracene | 5.147E-05 | 1.390E-07 | 6.236E-07 | 1.050E-07 | 2.829E-04 | 4.600E-09 | 7.072E-05 |
| chrysene | 5.560E-05 | 3.878E-07 | 6.708E-07 | 1.129E-07 | 3.043E-04 | 4,948E-09 | 7.607E-05 |
| benzo(b)fluoranthene | 1.001E-04 | 2.220E-07 | 1.213E-06 | 2.042E-07 | 5.501E-04 | 8,947E-09 | 1.375E-04 |
| benzo(k)fluoranthene | 1.311E-04 | 9.826E-08 | 1.592E-06 | 2.680E-07 | 7.221E-04 | 1.174E-08 | 1.805E-04 |
| benzo(a)pyrene | 1.833E-04 | 8.980E-08 | 2.226E-06 | 3.747E-07 | 1.010E-03 | 1.642E-08 | 2.524E-04 |
| indeno(1,2,3-cd)pyrene | 2.940E-04 | 1.659E-07 | 3.570E-06 | 6.010E-07 | 1.619E-03 | 2.633E-08 | 4.048E-04 |
| dibenz(a,h)anthracene | 9.271E-06 | 5.605E-08 | 1.126E-07 | 1.896E-08 | 5.109E-05 | 8.308E-10 | 1.277E-05 |
| benzo(g,h,i)perylene | 7.054E-04 | 2.408E-07 | 8.566E-06 | 1.442E-06 | 3.886E-03 | 6.319E-08 | 9.714E-04 |
| Dioxin/Furan Data | | | | | | | |
| 2378-TCDD | 8.448E-09 | 8.000E-12 | 1.026E-10 | 1.728E-11 | 4.655E-08 | 7.571E-13 | 1.164E-08 |
| 12378-PECDD | 1.185E-09 | 9.000E-12 | 1.429E-11 | 2.405E-12 | 6.480E-09 | 1.054E-13 | 1.620E-09 |
| 123478-HXCDD | 6.655E-10 | 1.050E-11 | Q | Q | QN | QN | 2 |
| 123678-HXCDD | 3.434E-09 | 1.700E-11 | 4.151E-11 | 6.989E-12 | 1.883E-08 | 3.062E-13 | 4.707E-09 |
| 123789-HXCDD | 1.261E-09 | 1.550E-11 | 1.513E-11 | 2.546E-12 | 6.861E-09 | 1.116E-13 | 1.715E-09 |
| 1234678-HPCDD | 2.972E-08 | 2.495E-10 | 3.580E-10 | 6.027E-11 | 1.624E-07 | 2.641E-12 | 4.060E-08 |
| ocpp | 1.730E-07 | 1.587E-09 | 2.082E-09 | 3.505E-10 | 9.444E-07 | 1.536E-11 | 2.361E-07 |
| 2378-TCDF | 3.725E-09 | 1.100E-11 | 4.511E-11 | 7.595E-12 | 2.046E-08 | 3.328E-13 | 5.116E-09 |
| 12378-PECDF | 3.500E-09 | 1.050E-11 | 4.239E-11 | 7.137E-12 | 1.923E-08 | 3.127E-13 | 4.807E-09 |
| 23478-PECDF | 1.641E-09 | 1.550E-11 | 1.975E-11 | 3.325E-12 | 8.957E-09 | 1.457E-13 | 2.239E-09 |
| 123478-HXCDF | 2.772E-09 | 2.800E-11 | 3.334E-11 | 5.612E-12 | 1.512E-08 | 2.459E-13 | 3.780E-09 |
| 123678-HXCDF | 1.185E-09 | 1.450E-11 | 1.422E-11 | 2.394E-12 | 6.450E-09 | 1.049E-13 | 1.613E-09 |
| 123789-HXCDF | 3.800E-10 | 6.000E-12 | QN | Q | QN | QN | QQ |
| | | | | | | | |

Table B-29: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases 200 meter location

| | 155mm pro | propelling charge DODI | pelling charge M3 (zone 5), M199 cannon DODIC: D540 | 9 cannon | No. of rounds (I) release duration (t): | - 4 | rounds |
|--------------------------|-----------------|--|--|--|---|-------------------|------------------------|
| | Š | Net Explosive Weight (NEW) in Ibs. | t (NEW) in ibs. => | 5.94 | Unit Concentration (UC): | 6.505E-05 | 6.505E-05 (g/m³)/(g/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 sk Rate Dilution Factor => | 0.95 | | | |
| | | | Reference of the second | The second secon | Total Mass of Substance | Average Modeled | Substance |
| | | | | | Emitted | Concentration for | Emission Rate for |
| Compound | Measured Actual | Measured | Average Adjusted | Average Adjusted | (grams/Item) | One Round | One Round |
| | Concentration | Concentration | (lb/ltem) | Emission Factor | | (grams/m³) | (3)sec) |
| | (mg/m²) | (mg/m³) | EF | (Ib/Ib NEW) | W | CONC | ER, |
| 234678-HXCDF | 1.157E-09 | 1.200E-11 | 1.391E-11 | 2.342E-12 | 6.310E-09 | 1.026E-13 | 1.577E-09 |
| 1234678-HPCDF | 1.244E-08 | 7.750E-11 | 1.502E-10 | 2.529E-11 | 6.814E-08 | 1.108E-12 | 1.703E-08 |
| 1234789-HPCDF | 5.860E-10 | 8.000E-12 | 7.022E-12 | 1.182E-12 | 3.185E-09 | 5.180E-14 | 7.963E-10 |
| OCDF | 7.895E-09 | 1.105E-10 | 9.457E-11 | 1.592E-11 | 4.290E-08 | 6.976E-13 | 1.072E-08 |
| Aldehydes | | _ | | | | | |
| Formaldehyde | 1.228E-02 | 1.228E-02 | ON | QN | QN | ND | QN |
| Acetaldehyde | 1.802E-02 | 1.802E-02 | QN | QN | QN | ON | QN |
| Acetone | 2.375E-02 | 4.751E-02 | ON | QN | GN | QN | QN |
| Acrolein | 2.294E-02 | 2.294E-02 | QN | QN | QN | ND | ΩN |
| Proprionaldehyde | 2.374E-02 | 2.374E-02 | QN | QN | GN | ND | QN |
| Crotonaldehyde | 2.867E-02 | 2,867E-02 | 2 | Q | ND | ND | QN |
| Butyraldehyde | 2.949E-02 | 2,949E-02 | 9 | 2 | QN | ND | QN |
| Benzaldehyde | 4.340E-02 | 4.340E-02 | QN | Q | QN | ND | QN |
| Isovaleraldehyde | 3.523E-02 | 3.523E-02 | QN | QN | QN | ND | QN |
| Valeraldehyde | 3.523E-02 | 3.523E-02 | Q | 2 | QN | QN | QN |
| o,m,p-Tolualdehyde | 1.474E-01 | 9.828E-02 | QN | Q | QN | ND | QN |
| Hexaldehyde | 4.097E-02 | 4.097E-02 | QN | 2 | QN | ND | QN |
| 2,5-Dimethylbenzaldehyde | 4.097E-02 | 4.097E-02 | ON | GN | QN | ON | QN |
| Acid gases | | | | | | | |
| Hydrogen fluoride | 1.400E-01 | 1.400E-01 | Q | QN | QN | ND | QN |
| Hydrogen chloride | 1.300E-01 | 1.300E-01 | QN | ON | QN | ND | QN |
| Hydrogen bromide | 1.400E-01 | 1.400E-01 | QN | ON | QN | ON | QN |
| Nitric Acid | 1.400E-01 | 1.400E-01 | Q | S | ΩN | ND | QN |
| Phosphoric acid | 1.400E-01 | 1.400E-01 | Q | QN | QN | ON | QN |
| Sulfuric Acid | 1.400E-01 | 1.400E-01 | ND | QN | ΩN | ON | QN |
| T 44 | | | | | | | |

Table B-30: Air Modeling Output Data for Cyanide and Energetics - 200 meter location

| | 155mm | propelling charge DODI | 155mm propelling charge M3 (zone 5), M199 cannon DODIC: D540 | 9 cannon | No. of rounds (I) release duration (I): | 1 | rounds seconds |
|-----------------------------|---|--|---|--|---|--|--|
| | eN. | Net Explosive Weigh | osive Weight (NEW) in lbs. => | 5.94 | Unit Concentration (UC): | 6.505E-05 | 6.505E-05 (g/m³)/(g/s) |
| | | Number or SF6 Leak Rate D | Number of Items = 1 Leak Rate Dilution Factor => | 0.95 | | | |
| | | Median | SECTION OF THE PROPERTY OF THE PARTY. | hartenn attis tible hartententen admis | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (Ib/Item) EF | Average Adjusted Emission Factor (ib/ib NEW) | Emitted (grams/item) M | Concentration for One Round (grams/m³) | Emission Kate for One Round (g/sec) ER, |
| Particulate Cyanide and HCN | | | | | | | |
| Particulate Cyanide | 1.200E-01 | 8.000E-02 | 1.458E-03 | 2.454E-04 | 6.613E-01 | 1.075E-05 | 1.653E-01 |
| Hydrogen Cyanide | 1.650E+00 | 8.500E-02 | 2.005E-02 | 3.375E-03 | 9.092E+00 | 1.479E-04 | 2.273E+00 |
| Energetics Data | | | | | | | |
| Nitrobenzene | 4.819E-01 | 2.031E-01 | QN | QN | QN | QN | QN |
| 2-Nitrotoluene | 4.819E-01 | 2.031E-01 | QN | QN | QN | ON . | QN |
| 3-Nitrotoluene | 4.819E-01 | 2.031E-01 | QΝ | QN | QN | QN | ΩN |
| 4-Nitrotoluene | 4.819E-01 | 2.031E-01 | QN | QN | QN | ON | QN |
| Nitroglycerine | 4.819E-01 | 2.031E-01 | QN | QN | QN | QN | QN |
| 1,3-Dinitrobenzene | 4.819E-01 | 2.031E-01 | QN | QN | ΩN | QN | QN |
| 2,6-Dinitrotoluene | 4.819E-01 | 2.031E-01 | QN | QN | QN | QN | QN |
| 2,4-Dinitrotoluene | 4.819E-01 | 2.031E-01 | QN | QN | QN | ON | QN |
| 1,3,5-Trinitrobenzene | 4.819E-01 | 2.031E-01 | 2 | QN | ND | QN | QN |
| 2,4,6-Trinitrotoluene | 4.819E-01 | 2.031E-01 | Q | 2 | QN | ΩN | QN |
| RDX | 4.819E-01 | 2.031E-01 | 2 | Q | QN | QN | QN |
| 4-Amino-2,6-Dinitrotoluene | 4.819E-01 | 2.031E-01 | QN | QN | ND | ON | ON |
| 2-Amino-4,6-Dinitrotoluene | 4.819E-01 | 2.031E-01 | QN | QN | GN | QN | S |
| Tetryl | 4.819E-01 | 2.031E-01 | QN | QN | QN | QN | QN |
| HMX | 9.639E-01 | 4.062E-01 | QN | QN | GN | QN | QN |
| Pentaerythritoltetranitrate | 9.639E-01 | 4.062E-01 | QN | QN | QN | QN | QN |
| Dibutyi phthalate | 2.410E+01 | 1.016E+01 | QN | QN | GN | QN | QN |
| Dioctyl phthalate | 2.410E+01 | 1.016E+01 | QN | QN | QN | ON | QN |
| Diphenylamine | 1.205E+01 | 5.078E+00 | GN | QN | ND | QN | ND |
| Eootpotoe: | | | | | | | |

Footnotes: ¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study)

ND = Not Detected

AIR MODELING OUTPUT DATA FOR CHARGE M3A1, FIRED FROM THE M199 CANNON, ZONE 3, 100 METERS DOWNWIND

Table B-31: Air Modeling Output Data for Gases, Metals, and Particulates - 100 meter location

| | 155mm p | ropelling charge | 155mm propelling charge M3A1 (zone 3), M199 cannon | 99 cannon | No. of rounds (I) | - | rounds |
|----------------------|--|--|---|--|------------------------------|--|--|
| | 2 | | • | C S | release duration (t): | 2 | 2 seconds |
| | Ž | Net Explosive Weight (NEW) in Ibs. Number of Items = 1 SF6 Leak Rate Dilution Factor | /e weignt (NEW) in ibs. => Number of items = 1 ak Rate Dilution Factor => | 3.50 0.93 | Unit Concentration (UC): | 9.348E-05 | 9.348E-05 (g/m³)/(g/s) |
| | Control of the Contro | | A CHINE CARRESTINE | the state of the s | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (tb/Item) EF | Average Adjusted Emission Factor (ib/lb NEW) | Emitted (grams/item) M | Concentration for One Round (grams/m³) CONC | Emission Rate for One Round (g/sec) ER, |
| Gases | | | | | | | |
| NH3 | 3.780E+00 | AN | 4.363E-02 | 1.246E-02 | 1.979E+01 | 9.249E-04 | 9.894E+00 |
| CO2 | 6.480E+01 | NA | 7.479E-01 | 2.137E-01 | 3.392E+02 | 1.586E-02 | 1.696E+02 |
| 00 | 1.725E+02 | NA | 1.991E+00 | 5.688E-01 | 9.030E+02 | 4.221E-02 | 4.515E+02 |
| NOx (as NO) | 2.460E-01 | NA | QN | QN | QN | Q | Q |
| CH4 | 2.178E+00 | NA | QN | QN | QN | QN N | QN |
| 802 | 5.240E-01 | NA | QN | QN | QN | 2 | 2 |
| Combined Particulate | | | | | | | |
| TSP | 5.189E+00 | 5.300E-02 | 6.374E-02 | 1.821E-02 | 2.891E+01 | 1.351E-03 | 1.446E+01 |
| PM10 | 3.692E+00 | 4.233E-02 | 4.529E-02 | 1.294E-02 | 2.054E+01 | 9.601E-04 | 1.027E+01 |
| PM2.5 | 1.999E+00 | 2.400E-02 | 2.451E-02 | 7.003E-03 | 1.112E+01 | 5.196E-04 | 5.559E+00 |
| Metals | | | | | | | |
| Antimony | 1.840E-04 | 4.345E-06 | QN | Q | QN | S | 9 |
| Arsenic | 1.193E-04 | 3.091E-06 | 1,442E-06 | 4.121E-07 | 6.542E-04 | 3.058E-08 | 3.271E-04 |
| Barlum | 2.518E-03 | 3.255E-05 | 3.085E-05 | 8.814E-06 | 1.399E-02 | 6.540E-07 | 6.996E-03 |
| Beryllium | 7.885E-05 | 1.649E-06 | ON | QN | QN | S | Q |
| Cadmlum | 8.713E-05 | 1.649E-06 | 1,081E-06 | 3.089E-07 | 4.904E-04 | 2.292E-08 | 2.452E-04 |
| Chromium | 7.007E-04 | 7.167E-06 | 8.606E-06 | 2.459E-06 | 3.904E-03 | 1.825E-07 | 1.952E-03 |
| Cobalt | 6.461E-05 | 3.763E-06 | 7.551E-07 | 2.157E-07 | 3,425E-04 | 1.601E-08 | 1.713E-04 |
| Copper | 6.788E-01 | 1.159E-03 | 8.409E-03 | 2.403E-03 | 3.814E+00 | 1.783E-04 | 1.907E+00 |
| Lead | 2.003E-02 | 6.770E-05 | 2.478E-04 | 7.079E-05 | 1.124E-01 | 5.253E-06 | 5.619E-02 |
| Manganese | 2.244E-03 | 3.086E-05 | 2.747E-05 | 7.848E-06 | 1.246E-02 | 5.823E-07 | 6.230E-03 |
| Nickel | 1.226E-03 | 1.433E-05 | 1.504E-05 | 4.297E-06 | 6.821E-03 | 3.188E-07 | 3,411E-03 |
| Selenium | 2.628E-04 | 5.497E-06 | ON | QN | QN | Q | Q |
| Sllver | 5.445E-05 | 1.099E-06 | 6.758E-07 | 1.931E-07 | 3.065E-04 | 1,433E-08 | 1.533E-04 |
| Thallium | 7.885E-05 | 1.613E-06 | QN | QN | QN | QN | QN |
| ZInc | 1.456E-01 | 1.445E-04 | 1,805E-03 | 5.159E-04 | 8.189E-01 | 3.828E-05 | 4.095E-01 |
| Footnotes: | | | | | | | |

Footnotes:
'ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study)
ND = Not Detected

Table B-32: Air Modeling Output Data for Volatile Organic Compounds - 100 meter location

| | 155mm propell | opelling charge | Ing charge M3A1 (zone 3), M199 cannon | 99 cannon | No. of rounds (I) | + | rounds |
|---------------------------------------|---|---|--|--|------------------------------|----------------------|---|
| | | igog | DODIC: D540 | - | release duration (t): | 2 | seconds |
| | IeN | Net Explosive Weight (NEW) in Ibs. | t (NEW) in lbs. => | 3.50 | Unit Concentration (UC): | 9.348E-05 | 9.348E-05 (g/m³)/(g/s) |
| | | Number of SF6 Leak Rate | Number of items = 1 eak Rate Dilution Factor => | 0.93 | | | |
| | | | | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (lb/Item) EF | Average Adjusted Emission Factor (lb/lb NEW) | Emitted (grams/ltem) M | One Round (grams/m³) | Chinssion rate for One Round (g/sec) ER ₁ |
| -300 | | | | | | | |
| Dichlorodiffuoromethane | 3.762E-03 | 3.762E-03 | QN | Q | QN | QN | 9 |
| Methyl Chloride | 1.594E-03 | 1.594E-03 | QN | S | QN | QN | QN |
| Dichlorotetrafluoroethane | 4.683E-03 | 4.683E-03 | ON | ΩN | ND | QN | QN |
| Vinyi Chloride | 5.069E-03 | 5.069E-03 | ON | QN | QN | QN | S |
| 1,3-Butadiene | 1.790E-03 | 1.790E-03 | QN | QN | QN | QN | 2 |
| Methyl Bromide | 3.073E-03 | 3.073E-03 | QN | QN | QN | QN | 2 |
| Ethyl Chloride | 2.112E-03 | 2.112E-03 | QN | QN | QN | QN | QN |
| Trichlorofluoromethane | 3.934E-03 | 3.934E-03 | Q | QN | QN | ΩN | ON |
| 1,1-Dichloroethene | 9.107E-03 | 6.696E-03 | 2.992E-05 | 8.549E-06 | 1.357E-02 | 6.343E-07 | 6.786E-03 |
| Dichloromethane | 2.102E-01 | 5.722E-03 | 2.538E-03 | 7.251E-04 | 1.151E+00 | 5.381E-05 | 5.756E-01 |
| 3-Chloropropene | 2.754E-03 | 2.754E-03 | QN | QN | ND | QN | QN |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 4.799E-03 | 5.750E-03 | QN | QN | ND | Q | Q |
| 1,1-Dichloroethane | 3.159E-03 | 3.159E-03 | QN | QN | ND | GN | ND |
| cls-1,2-Dichloroethene | 3.295E-03 | 3.295E-03 | QN | QN | QN | GN | QN |
| Trichloromethane | 4.099E-03 | 4.099E-03 | QN | QN | ND | QN | Q |
| 1,2-Dichloroethane | 3.443E-03 | 3.443E-03 | 2 | 9 | QN | Q | QN N |
| 1,1,1-Trichloroethane | 3.272E-02 | 1.095E-01 | QN | 2 | QN | Q | QN |
| Benzene | 5.900E-02 | 2.329E-03 | 7.322E-04 | 2.092E-04 | 3.321E-01 | 1.552E-05 | 1.661E-01 |
| Carbon Tetrachloride | 4.529E-03 | 4.529E-03 | QN | QN | ND | Q | Q |
| 1,2-Dichloropropane | 3,419E-03 | 3.419E-03 | QN | QN | QN | QN | ON |
| Trichloroethene | 3.866E-03 | 3.866E-03 | QN | QN | QN | QN | ND |
| cls-1,3-Dichloropropene | 3.360E-03 | 3.360E-03 | QN | ON | QN | QN | DN |
| trans-1,3-Dichloropropene | 2.860E-03 | 2.860E-03 | QN | QN | QN | QN | ON |
| 1,1,2-Trichloroethane | 3.877E-03 | 3.877E-03 | ND | QN | ND | Q | QN |
| Toluene | 6.492E-03 | 3,610E-03 | 3.577E-05 | 1.022E-05 | 1.622E-02 | 7.583E-07 | 8.112E-03 |
| 1,2-Dibromoethane | 5.844E-03 | 5.844E-03 | Q | QV | QN | S | Q |
| Tetrachloroethene | 4.475E-03 | 4.475E-03 | QN | NΩ | ΩN | QN | ΩN |

Table B-32: Air Modeling Output Data for Volatile Organic Compounds - 100 meter location

| | 155mm prope | ropelling charge DODI | Iling charge M3A1 (zone 3), M199 cannon DODIC: D540 | 99 cannon | No. of rounds (I) release duration (I): | 1 2 | 1 rounds 2 seconds |
|---------------------------|----------------------------------|--|---|-------------------------------------|---|--|---|
| | Ne | Net Explosive Weight (NEW) in ibs. Number of items = 1 SF6 Leak Rate Dilution Factor | /e Weight (NEW) in lbs. => Number of Items = 1 ak Rate Dilution Factor => | 3.50 0.93 | Unit Concentration (UC): | 9.348E-05 | 9.348E-05 (g/m³)/(g/s) |
| | | ALLOND FILMENDALISM | MALL COMPANY | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background Concentration | Average Adjusted Emission Factor (tb/Item) | Average Adjusted Emlssion Factor | Emltted (grains/Item) | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) |
| | (mg/m²) | (mg/m³) | EF | (ID/ID NEW) | M | CONC | ER, |
| Chlorobenzene | 2.305E-04 | 2,305E-04 | QN | QN | QN | ΩN | ΩN |
| Ethylbenzene | 2.344E-03 | 2.344E-03 | QN | QN | QN | QN | QN |
| m&p-Xylene | 2.257E-03 | 2.257E-03 | QN | QN | ON | ON | QN |
| Styrene | 2.641E-03 | 2.641E-03 | QN | QN | ON | QN | 2 |
| 1,1,2,2-Tetrachloroethane | 4.466E-03 | 4,466E-03 | QN | QN | QN | QN | Q |
| o-Xylene | 2.474E-03 | 2.474E-03 | ON | QN | QN | QN | Q |
| 4-Ethyltoluene | 2.214E-03 | 2.214E-03 | ON | QN | QN | QN | Q |
| 1,3,5-Trimethylbenzene | 2.460E-03 | 2.460E-03 | ON | QN | QN | QN | QN |
| 1,2,4-Trimethylbenzene | 2.312E-03 | 2.312E-03 | QN | QN | QN | QN | Q. |
| Benzyl Chloride | 5.076E-03 | 5.076E-03 | ON | QN | QN | QN | ON |
| m-Dichlorobenzene | 3.366E-03 | 3,366E-03 | QN | QN | QN | QN | QN |
| p-Dichlorobenzene | 2.945E-03 | 2.945E-03 | QN | QN | QN | ND | QN |
| o-Dichlorobenzene | 3.606E-03 | 3.606E-03 | QN | QN | QN | QN | QN. |
| 1,2,4-Trichlorobenzene | 4.526E-03 | 4.526E-03 | QN | QN | QN | QN | ON |
| Hexachtorobutadiene | 4.690E-03 | 4.690E-03 | 9 | Q | . QN | ND | QN |
| Methane | 2.222E+00 | 1.364E+00 | 1.065E-02 | 3.043E-03 | 4.831E+00 | 2.258E-04 | 2,415E+00 |
| Ethane | 6.764E-01 | 6.764E-01 | QN | Q | QN | ND | ΩN |
| Ethylene | 6.310E-01 | 6.310E-01 | DN | Q | ON | ON | QN |
| Propane | 9.920E-01 | 9.920E-01 | ND | Q | QN | QN | QN |
| Acetylene | 5.858E-01 | 5.858E-01 | QV | Q. | ON | ND | QN |
| Isobutane | 1.307E+00 | 1.307E+00 | QN | QN | QN | QN | QN |
| n-Butane | 1.307E+00 | 1.307E+00 | QN | QN | QN | QN | QN |
| Propylene | 9,466E-01 | 9.466E-01 | QN | <u>Q</u> | QN | ON | QN |
| Footnotes: | | | | | | | |

connores:

Table B-33; Air Modeling Output Data for Semi-Volatile Organic Compounds - 100 meter location

| | 7 | | The observation of the contract of the contrac | 00 00000 | (I) abanca jo oN | 7 | apanoa |
|-----------------------------|---|--|--|--|------------------------------|--|--|
| - | | | DODIC: D540 | | release duration (t): | 2 | seconds |
| | ₽ N | Net Explosive Weigh | osive Weight (NEW) in lbs. => | 3.50 | Unit Concentration (UC): | 9.348E-05 | 9.348E-05 (g/m³)/(g/s) |
| | | Number or SF6 Leak Rate D | Number of Items = 1 Leak Rate Dilution Factor => | 0.93 | | | |
| | | and the continue | Seculation has a supplied by | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (lb/item) EF | Average Adjusted Emission Factor (Ib/Ib NEW) | Emitted (grams/item) M | Concentration for One Round (grams/m³) | Emission Kate for One Round (g/sec) ER, |
| SVOCs | | | | | | | |
| n-nitrosodImethylamine | 2.829E-03 | 5.605E-05 | Q | QN | QN | QN | ΩN |
| bis(2-chloroethyl)ether | 2.829E-03 | | QN | QN | QN | QN | QN |
| phenol | 2.100E-02 | 7.120E-03 | 1.722E-04 | 4.921E-05 | 7.812E-02 | 3.651E-06 | 3.906E-02 |
| 2-chlorophenol | 2.829E-03 | 5.605E-05 | QN | QN | ON | NO NO | QN |
| 1,3-dichlorobenzene | 2.829E-03 | 5,605E-05 | S | 2 | ON | 2 | Q. |
| 1,4-dichlorobenzene | 2.829E-03 | 5.664E-05 | S | Q | QN | S | QN |
| 1,2-dichlorobenzene | 2.829E-03 | 5,605E-05 | QN | ON | ON | ΩN | QN |
| benzyl alcohol | 2.829E-03 | 5,605E-05 | QN | QN | ND | ND | QN |
| bis(2-chlorolsopropyl)ether | 2,829E-03 | 5.605E-05 | Q | S | ON | SO | QN |
| 2-methylphenol | 2.829E-03 | 5.605E-05 | QN | QN | ON | ND | ΩN |
| hexachloroethane | 2.829E-03 | 5.605E-05 | QN | QN | ON | ΩN | QN |
| n-nitroso-di-n-propylamine | 2.829E-03 | 5.605E-05 | QN | ON | ON | ND | QN |
| 4-methylphenol | 2,829E-03 | 5.605E-05 | QN | QN | QN | QN | QN |
| nitrobenzene | 2.829E-03 | 5.605E-05 | QN | QN | QN | ND | QN |
| isophorone | 2.829E-03 | 5.605E-05 | QN | QN | QN | QN | QN |
| 2-nitrophenol | 2.829E-03 | 3.660E-04 | QN | QN | ND | QN | NO |
| 2,4-dimethylphenol | 2.829E-03 | 5.605E-05 | QN | QN | ΩN | DN | ON |
| bls(2-chloroethoxy)methane | 2.829E-03 | 5.605E-05 | 2 | QZ | ΩN | S | S |
| 2,4-dichlorophenol | 2.829E-03 | 5.605E-05 | ON | Q | ND | DN | ON |
| 1,2,4-trichlorobenzene | 2.829E-03 | 5.605E-05 | QN | QN | ND | ON | QN |
| naphthalene | 3.112E-03 | 1,366E-04 | 3.693E-05 | 1.055E-05 | 1.675E-02 | 7.828E-07 | 8.374E-03 |
| 4-chloroaniline | 2.829E-02 | 5.605E-04 | QN | QN | ND | QN | QN |
| hexachlorobutadlene | 2.829E-03 | | QN | QN | QN | QN | QN |
| 4-chloro-3-methylphenol | 2.829E-03 | | 9 | QN | ND | ON | QN |
| 2-methylnaphthalene | 2:829E-03 | 1.694E-04 | Q | Q | QN | ON | SD |
| hexachlorocyclopentadlene | 2.829E-03 | 5,605E-05 | QN | QQ | QN | QN | QQ |
| 2,4,6-trichlorophenol | 2.829E-03 | 5.605E-05 | QN | Q | QN | ON | QN |

Table B-33: Air Modeling Output Data for Semi-Volatile Organic Compounds - 100 meter location

| | 155mm p | ropelling charge DODI | i55mm propelling charge M3A1 (zone 3), M199 cannon DODIC: D540 | 99 cannon | No. of rounds (!) | 1 0 | 1 rounds |
|--|-----------------|--|---|--|--------------------------|--|---|
| | Ž | Net Explosive Weight (NEW) in Ibs. Number of Items = 1 SF6 Leak Rate Dilution Factor | ve Weight (NEW) in Ibs. => Number of Items = 1 ak Rate Dilution Factor => | 3.50 0.93 | Unit Concentration (UC): | 9.348E-05 | 9.348E-05 (g/m³)/(g/s) |
| | | | | The state of the s | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual | Measured Background Concentration | Average Adjusted Emission Factor (lb/item) | Average Adjusted Emission Factor | Emitted (grams/item) | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) |
| | (B) | (mg/m ₃) | III I | (ID)ID NEVV) | Σ | CONC | ER, |
| 2,4,5-trichlorophenol | 2.829E-03 | 5.605E-05 | QN | QN | QN | QN | CN |
| 2-chloronaphthalene | 2.829E-03 | 5.605E-05 | QN | ON | QN | QN | QN |
| 2-nitroaniline | 2.829E-03 | 5.605E-05 | QN | QN | QN | QN | QN |
| dimethylphthalate | 2.829E-03 | 5.605E-05 | QN | QN | QN | S | QN |
| Z,6-dinitrotoluene | 2.829E-03 | 5.721E-05 | QN | QN. | QN | QN | QN |
| 3-nitroaniline | 5.658E-03 | 1.121E-04 | Q | ΩN | QN | S | QN |
| 2,4-dinitrophenol | 5.658E-03 | 1.121E-04 | QN | QN | ON | S | Q |
| dibenzoturan | 2.829E-03 | 7.823E-05 | Q | ON. | ND | QN | QN |
| 2,4-dinitrotoluene | 2.829E-03 | 5.605E-05 | Q | 2 | QN | QN | QN |
| 4-nitrophenol | 5.658E-03 | 1.316E-04 | Q | QN | QN | QV | QN |
| 4-chlorophenyl-phenylether | 2.829E-03 | 5.605E-05 | QQ | QN | QN | ND | QN |
| dietnyprinalate | Z.829E-03 | 5.605E-05 | Q | 2 | QN | QN | QN |
| 4-IIII Oalliilid 4 A-dinitro-2-mathylobanol | 5.658E-03 | 1.121E-04 | Q | Q. | QN | QN | QN |
| n-nitrosodinhenvlamine(1) | 2.030E-03 | 1.121E-04 5.605E-05 | 2 2 | | ON | QN | ΩN |
| 4-bromonhenvl-phenvlether | 2 R20E-03 | R 808E-08 | | 2 2 | ON C | QN | Q |
| hexachlorohenzene | 2 820E-03 | 5.505E-03 | | 2 2 | ON | QV | QN |
| novacimo cocincento | 2.023E-03 | 3.003E-03 | 2 | ₽! | QN | QN | Q |
| penaciliolophielloi | 3.038E-U3 | 1.721E-04 | S | 2 | ON | 2 | QN · |
| di-n-butyipntnalate | 2.829E-03 | 1.080E-04 | Q | Q | QN | QN | 9 |
| outyloenzylphthalate | 2.829E-03 | 5.605E-05 | QN | Q | QN | QN | QN |
| ois(z-ethylnexyl)phthalate | 2.829E-03 | 5.605E-05 | Q | Q | QN | QN | QQ |
| di-n-octylphthalate | 2.829E-03 | 5.605E-05 | QN | ON | QN | QN | QN |
| Footnotes: | | | | | | | |

¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

Table B-34: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases 100 meter location

| 100 meter location | 1011 | | | | | | |
|------------------------|---------------|------------------------------------|--|------------------|--------------------------|-----------------|--------------------------------|
| | 155mm pr | opelling charge | 155mm propelling charge M3A1 (zone 3), M199 cannon | 99 cannon | No. of rounds (I) | - " | rounds |
| | | DODI | DODIC: D540 | | release duration (t): | 2 | seconds |
| | Ne | Net Explosive Weight (NEW) in lbs. | t (NEW) in lbs. => | 3.50 | Unit Concentration (UC): | 9.348E-05 | 9.348E-05 (g/m³)/(g/s) |
| | | Number | | 6 | | | - |
| | | SF6 Leak Rate Dijution Factor | ution Factor => | 0.93 | | | |
| | | OMOJE JOVANIA | ALIMITY YEAR TO LOUIS HOUSE | | Total Mass of Substance | Average Modeled | Substance Emission Rate for |
| | Money Actual | Measured | Average Adjusted | Average Adjusted | (grams/Item) | One Round | One Round |
| Compound | Concentration | Background | Emission Factor | Emission Factor | | (grams/m³) | (a/sec) |
| | (mg/m³) | (mg/m³) | (ID)(ID) | (Ib/Ib NEW) | ¥ | CONC | ER, |
| PAHs (TO-13 Method) | | | | • | | | |
| acenaphthylene | 4.910E-04 | 1.328E-06 | 6.076E-06 | 1.736E-06 | 2.756E-03 | 1,288E-07 | 1.378E-03 |
| acenaphthene | 1.507E-04 | 9.544E-05 | 6.854E-07 | 1.958E-07 | 3.109E-04 | 1.453E-08 | 1.554E-04 |
| fluorene | 2.571E-04 | 6.502E-05 | 2.383E-06 | 6.810E-07 | 1.081E-03 | 5.053E-08 | 5.405E-04 |
| phenanthrene | 3.933E-04 | 6.428E-05 | 4.083E-06 | 1.167E-06 | 1.852E-03 | 8.657E-08 | 9.261E-04 |
| anthracene | 4.472E-05 | 4.197E-06 | 5.028E-07 | 1.437E-07 | 2.281E-04 | 1.066E-08 | 1.140E-04 |
| fluoranthene | 1.899E-04 | 7.852E-06 | 2.259E-06 | 6.455E-07 | 1.025E-03 | 4.790E-08 | 5.124E-04 |
| pyrene | 4.444E-04 | 6.908E-06 | 5.429E-06 | 1.551E-06 | 2.463E-03 | 1.151E-07 | 1.231E-03 |
| benzo(a)anthracene | 2.472E-05 | 1.390E-07 | 3.051E-07 | 8.716E-08 | 1.384E-04 | 6.468E-09 | 6.919E-05 |
| chrysene | 3.038E-05 | 3.878E-07 | 3.722E-07 | 1.063E-07 | 1.688E-04 | 7.891E-09 | 8.441E-05 |
| benzo(b)fluoranthene | 8.760E-05 | 2.220E-07 | 1.084E-06 | 3.098E-07 | 4.919E-04 | 2.299E-08 | 2.459E-04 |
| benzo(k)fluoranthene | 5.658E-05 | 9.826E-08 | 7.010E-07 | 2.003E-07 | 3.179E-04 | 1.486E-08 | 1.590E-04 |
| benzo(a)pyrene | 1.118E-04 | 8.980E-08 | 1.386E-06 | 3.960E-07 | 6.287E-04 | 2.939E-08 | 3.144E-04 |
| indeno(1,2,3-cd)pyrene | 1.997E-04 | 1.659E-07 | 2.476E-06 | 7.074E-07 | 1.123E-03 | 5,249E-08 | 5.615E-04 |
| dibenz(a.h)anthracene | 6.252E-06 | 5.605E-08 | 7.758E-08 | 2.217E-08 | 3.519E-05 | 1.645E-09 | 1.760E-05 |
| benzo(a,h.))pervlene | 3.906E-04 | 2.408E-07 | 4.844E-06 | 1.384E-06 | 2.197E-03 | 1.027E-07 | 1.099E-03 |
| Dioxin/Furan Data | | | | | | | |
| 2378-TCDD | 3.445E-10 | 8.000E-12 | ND | QN | QN | QN | 2 |
| 12378-PECDD | 3.440E-10 | 9.000E-12 | 4.157E-12 | 1.188E-12 | 1,886E-09 | 8.814E-14 | 9.429E-10 |
| 123478-HXCDD | 4.715E-10 | 1.050E-11 | QN N | Q | QN | Q | 2 |
| 123678-HXCDD | 9.690E-10 | 1.700E-11 | 1.181E-11 | 3.375E-12 | 5.359E-09 | 2.505E-13 | 2.679E-09 |
| 123789-HXCDD | 1,086E-09 | 1.550E-11 | 1.328E-11 | 3.796E-12 | 6.026E-09 | 2.816E-13 | 3.013€-09 |
| 1234678-HPCDD | 9.763E-09 | 2.495E-10 | 1.181E-10 | 3,373E-11 | 5.355E-08 | 2.503E-12 | 2.677E-08 |
| OCDD | 3.881E-08 | 1.587E-09 | 4.619E-10 | 1.320E-10 | 2.095E-07 | 9.793E-12 | 1.048E-07 |
| 2378-TCDF | 5.095E-10 | 1.100E-11 | ON | QQ | QN | Q | QN |
| 12378-PECDF | 2.885E-10 | 1,050E-11 | QN | QN | QN | Q | QN |
| 23478-PECDF | 1,595E-10 | 1,550E-11 | ON | Q | QN | Q | QN |
| 123478-HXCDF | 1.980E-10 | 2,800E-11 | 2,110E-12 | 6.028E-13 | 9.569E-10 | 4,473E-14 | 4.785E-10 |
| 123678-HXCDF | 1.525E-10 | 1,450E-11 | <u>Q</u> | 2 | QN | Q. | 2 |
| 123789-HXCDF | 2.730E-10 | 6.000E-12 | QN | Q | ON | Q | QN |
| | | | | | | | |

Table B-34: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases 100 meter location

| | 155mm p | ropelling charge | 155mm propelling charge M3A1 (zone 3), M199 cannon | 99 cannon | No. of rounds (I) | *** | rounds |
|--------------------------|--|---|--|--|--------------------------|-------------------------|------------------------|
| | | DOD | DODIC: D540 | | release duration (t): | 2 | seconds |
| | eN. | Net Explosive Weigh | cplosive Weight (NEW) in lbs. => | 3.50 | Unit Concentration (UC): | 9.348E-05 | 9.348E-05 (g/m³)/(g/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 ak Rate Dilution Factor => | 0.93 | | | · ! |
| | | Separation of the separate of | Designation of the second of t | | Total Mass of Substance | Average Modeled | Substance |
| | Market And State of the State o | Monthly | | AN A CONTRACTOR OF THE STATE OF | Emitted | Concentration for | Emission Rate for |
| Compound | Measured Actual Concentration | Background Concentration | Average Adjusted Emission Factor (Ib/item) | Average Adjusted Emission Factor | (grams/item) | One Round (grams/m³) | One Round (g/sec) |
| | (mg/m²) | (mg/m ₃) | EF | (ID/ID INEW) | Σ | CONC | ER, |
| 234678-HXCDF | 2.255E-10 | 1.200E-11 | QN | , QN | S | QN | QN |
| 1234678-HPCDF | 7.025E-10 | 7.750E-11 | 7.756E-12 | 2.216E-12 | 3.518E-09 | 1.644E-13 | 1.759E-09 |
| 1234789-HPCDF | 2.635E-10 | 8.000E-12 | ON | QN | ND | QN | QN |
| OCDF | 1.347E-09 | 1.105E-10 | 1.534E-11 | 4.384E-12 | 6.960E-09 | 3.253E-13 | 3.480E-09 |
| Aldehydes | | | | | | | |
| Formaldehyde | 1.228E-02 | 1.228E-02 | QN | QN | ND | QN | QV |
| Acetaldehyde | 1.802E-02 | 1.802E-02 | ND | QN | QN | QN | QN |
| Acetone | 2.375E-02 | 4.751E-02 | QN | QN | QN | QN | QN |
| Acrolein | 2.294E-02 | 2.294E-02 | ON | ON | QN | S | QN |
| Proprionaldehyde | 2.374E-02 | 2.374E-02 | NO NO | ON | ON | QN | Q |
| Crotonaldehyde | 2.867E-02 | 2.867E-02 | QN | QN | QN | QN | QN |
| Butyraldehyde | 2.949E-02 | 2.949E-02 | QN | ND | QN | Q | 2 |
| Benzaldehyde | 4.340E-02 | 4.340E-02 | QN | QN | ON | QN | QN |
| isovaleraldehyde | 3.523E-02 | 3.523E-02 | QN | ON. | QN | Q | Q |
| Valeraldehyde | 3.523E-02 | 3.523E-02 | QN | QN | ON | QN | 2 |
| o,m,p-Tolualdehyde | 9.828E-02 | 9.828E-02 | QN | Q | ON | QN | Q |
| Hexaldehyde | 4.097E-02 | 4.097E-02 | QN | QN | QN | Ω | QN |
| 2,5-Dimethylbenzaldehyde | 4.097E-02 | 4.097E-02 | 2 | S | ON | QN | Q |
| Acid gases | | | | | | | |
| Hydrogen fluoride | 1.400E-01 | 1.400E-01 | QN | QN | QN | QN | ON |
| Hydrogen chloride | 1.300E-01 | 1.300E-01 | QN | QΝ | QN | S | QV |
| Hydrogen bromide | 1.400E-01 | 1.400E-01 | QN | QN | QN | S | QN |
| Nitric Acid | 1.400E-01 | 1.400E-01 | ON | QN | QN | S | QN |
| Phosphoric acid | 1.400E-01 | 1.400E-01 | QN | QN | ND | QN | SN. |
| Sulfuric Acid | 1.400E-01 | 1.400E-01 | ND | QN | ND | ND | QN |
| Footnotes: | | | | | | | |

Table B-35: Air Modeling Output Data for Cyanide and Energetics - 100 meter location

| | 155mm propel | ropelling charge DODI | ling charge M3A1 (zone 3), M199 cannon DODIC: D540 | 199 cannon | No. of rounds (I) release duration (t): | 7 | 1 rounds 2 seconds |
|-----------------------------|---|--|--|--|---|--|--|
| | eX. | Net Explosive Weigh Number | losive Weight (NEW) in lbs. => Number of Items = 1 | 3.50 | Unit Concentration (UC): | 9.348E-05 | 9.348E-05 (g/m³)/(g/s) |
| | | SF6 Leak Rate D | Leak Rate Dilution Factor => | 0.93 | | | |
| | | | | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (lb/Item) EF | Average Adjusted Emission Factor (ib/lb NEW) | Emitted (grams/item) M | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) ER ₁ |
| Particulate Cyanide and HCN | | | | ٠ | | | |
| Particulate Cyanide | 8.000E-02 | 8.000E-02 | QN | 9 | QN | QN | QN |
| Hydrogen Cyanide | 3.800E-01 | 8.500E-02 | 4.716E-03 | 1.347E-03 | 2.139E+00 | 9.998E-05 | 1.070E+00 |
| Energetics Data | | | | | | | |
| Nitrobenzene | 4.740E-01 | 2.031E-01 | QN | QN | ND | ON | QN |
| 2-Nitrotoluene | 4.740E-01 | 2.031E-01 | QN | QN | QN | ON | ΩN |
| 3-Nitrotoluene | 4.740E-01 | 2.031E-01 | QN | QN | QN | ON | Q |
| 4-Nitrotoluene | 4.740E-01 | 2.031E-01 | QN | 2 | ON | QN | QN |
| Nitroglycerine | 4.740E-01 | 2.031E-01 | Q | Q | ON | ON. | QN |
| 1,3-Dinitrobenzene | 4.740E-01 | 2.031E-01 | QN | Q | QN | QN | QN |
| 2,6-Dinitrotoluene | 4.740E-01 | 2,031E-01 | 오 | Q | QN | ND | QN |
| 2,4-Dinitrotoluene | 4.740E-01 | 2.031E-01 | QN | QN | QN | QN | QN |
| 1,3,5-Trinitrobenzene | 4.740E-01 | 2.031E-01 | QN | Q | ON | QN | QN |
| 2,4,6-Trinitrotoluene | 4.740E-01 | 2.031E-01 | Q | Q | QN | QN | QN |
| RDX | 4.740E-01 | 2.031E-01 | 9 | 2 | QN | 2 | S |
| 4-Amino-2,6-Dinitrotoluene | 4.740E-01 | 2.031E-01 | Q | Q | QN | QN | ND |
| 2-Amino-4,6-Dinitrotoluene | 4.740E-01 | 2.031E-01 | Q | QN | ND | QN | QN |
| Tetryl | 4.740E-01 | 2.031E-01 | 2 | Q | ON | ON | ON |
| HMX | 9.481E-01 | 4.062E-01 | Q | Q | ND | QN | QN |
| Pentaerythritoltetranitrate | 9.481E-01 | 4.062E-01 | Q | Q | QN | ON | QN |
| Dibutyl phthalate | 2.370E+01 | 1.016E+01 | 2 | Q | QN | QN | QN |
| Dioctyl phthalate | 2.370E+01 | 1.016E+01 | QN | Q | QN | ON | QN |
| Diphenylamine | 1.185E+01 | 5.078E+00 | ND | ND | ND | QN | ON |

Footnotes:

AIR MODELING OUTPUT DATA FOR CHARGE M3A1, FIRED FROM THE M199 CANNON, ZONE 3, 200 METERS DOWNWIND

Table B-36: Air Modeling Output Data for Gases, Metals, and Particulates - 200 meter location

| | 155mm p | ropelling charge | 155mm propelling charge M3A1 (zone 3). M199 cannon | 99 cannon | (I) abunda of rounds (I) | - | rounde |
|----------------------|----------------------------------|--|--|-------------------------------------|--------------------------|--|---|
| | | IGOG | DODIC: D540 | | release duration (t): | - 4 | seconds |
| | ž | Net Explosive Weigh | plosive Weight (NEW) in lbs. => | 3.50 | Unit Concentration (UC): | 4.833E-05 | 4.833E-05 (g/m³)/(g/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 ak Rate Dilution Factor => | 0,93 | | | |
| | | WARREN STATE | A STOLETHING THE STATE OF THE S | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background Concentration | Average Adjusted Emission Factor (lb/item) | Average Adjusted Emission Factor | Emitted (grams/Item) | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) |
| | , | (mg/m³) | EF | | Σ | CONC | ER, |
| Gases | | | | | | | |
| NH3 | 3.780E+00 | NA | 4.363E-02 | 1.246E-02 | 1.979E+01 | 2.391E-04 | 4.947E+00 |
| CO2 | 6,480E+01 | NA | 7.479E-01 | 2.137E-01 | 3.392E+02 | 4.099E-03 | 8.481E+01 |
| 00 | 1.725E+02 | NA | 1.991E+00 | 5.688E-01 | 9.030E+02 | 1.091E-02 | 2.258E+02 |
| NOx (as NO) | 2.460E-01 | NA | QN | QN | QN | S | QN. |
| CH4 | 2.178E+00 | ΝA | QN | QN | QN | S | QN |
| 802 | 5.240E-01 · | NA | QN | QN | QN | 9 | S |
| Combined Particulate | | | | | | | |
| TSP | 5.189E+00 | 5.300E-02 | 6.374E-02 | 1.821E-02 | 2.891E+01 | 3.493E-04 | 7.228E+00 |
| PM10 | 3.692E+00 | 4.233E-02 | 4.529E-02 | 1.294E-02 | 2.054E+01 | 2.482E-04 | 5.135E+00 |
| PM2.5 | 1.999E+00 | 2.400E-02 | 2.451E-02 | 7.003E-03 | 1.112E+01 | 1.343E-04 | 2.779E+00 |
| Metals | | | | | | | |
| Antimony | 1.840E-04 | 4.345E-06 | QN · | QN | QN | Q | QN |
| Arsenic | 1.193E-04 | 3.091E-06 | 1.442E-06 | 4.121E-07 | 6.542E-04 | 7.904E-09 | 1.635E-04 |
| Barlum | 2.518E-03 | 3.255E-05 | 3.085E-05 | 8.814E-06 | 1.399E-02 | 1.691E-07 | 3.498E-03 |
| Berylllum | 7.885E-05 | 1.649E-06 | QN | QN | QN | QN | QN. |
| Cadmlum | 8.713E-05 | 1.649E-06 | 1.081E-06 | 3.089E-07 | 4.904E-04 | 5.926E-09 | 1.226E-04 |
| Chromium | 7.007E-04 | 7.167E-06 | 8.606E-06 | 2.459E-06 | 3.904E-03 | 4.717E-08 | 9.760E-04 |
| Cobait | 6.461E-05 | 3.763E-06 | 7.551E-07 | 2.157E-07 | 3.425E-04 | 4.138E-09 | 8.563E-05 |
| Copper | 6.788E-01 | 1.159E-03 | 8.409E-03 | 2.403E-03 | 3.814E+00 | 4.609E-05 | 9.536E-01 |
| Lead | 2.003E-02 | 6.770E-05 | 2.478E-04 | 7.079E-05 | 1.124E-01 | 1.358E-06 | 2.810E-02 |
| Manganese | 2.244E-03 | 3.086E-05 | 2.747E-05 | 7.848E-06 | 1.246E-02 | 1.505E-07 | 3.115E-03 |
| Nickel | 1.226E-03 | 1.433E-05 | 1.504E-05 | 4.297E-06 | 6.821E-03 | 8.242E-08 | 1.705E-03 |
| Selenium | 2.628E-04 | 5.497E-06 | QN | QN | QN | QN | QN. |
| Silver | 5.445E-05 | 1.099E-06 | 6.758E-07 | 1.931E-07 | 3.065E-04 | 3.704E-09 | 7.663E-05 |
| Thallium | 7.885E-05 | 1,613E-06 | ON | QN . | QN | Q | 2 |
| Zinc | 1.456E-01 | 1.445E-04 | 1.805E-03 | 5.159E-04 | 8.189E-01 | 9.895E-06 | 2.047E-01 |
| Footnotes: | + | | | | | | |

Table B-37: Air Modeling Output Data for Volatile Organic Compounds - 200 meter location

| | 155mm propell | opelling charge | Ing charge M3A1 (zone 3), M199 cannon | 99 cannon | No. of rounds (f) | - | rounds |
|---------------------------------------|-------------------------------|---|--|-------------------------------------|--------------------------|--|---|
| | | Naoa | DODIC: D540 | | release duration (t): | 4 | seconds |
| | Nei | Net Explosive Welght (NEW) in ibs. | t (NEW) In lbs. => | 3.50 | Unit Concentration (UC): | 4.833E-05 | 4.833E-05 (g/m³)/(g/s) |
| | · · · | Number of SF6 Leak Rate D | Number of Items = 1 Leak Rate Dilution Factor => | 0.93 | | | |
| | | | To falled Skicker (1) | S. Contraction of the second | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background Concentration | Average Adjusted Emission Factor (tb/item) | Average Adjusted Emission Factor | Emitted (grams/Item) | Concentration for One Round (grams/m³) | Emission Kate for One Round (g/sec) |
| | (mg/m.) | (mg/m³) | 品 | (איביאי פוייפו) | Σ | CONC | ER ₁ |
| VOCs | | | | | | | |
| Dichlorodifluoromethane | 3.762E-03 | 3.762E-03 | QN | Q | QN | S | QN |
| Methyl Chloride | 1.594E-03 | 1,594E-03 | QN | QN | QN | ND ND | ND |
| Dichlorotetrafluoroethane | 4.683E-03 | 4.683E-03 | QN | QN | QN | Q | ND |
| Vinyl Chloride | 5.069E-03 | 5.069E-03 | ON | DN | QN | Q | Q |
| 1,3-Butadiene | 1.790E-03 | 1.790E-03 | QN | QN | QN | Q. | QN |
| Methyl Bromide | 3.073E-03 | 3.073E-03 | ON | QN | QN | Q | ON |
| Ethyl Chloride | 2.112E-03 | 2.112E-03 | QN | QN | QN | ΩN | 2 |
| Trichloroftuoromethane | 3.934E-03 | 3.934E-03 | ON | Q | QN | Q | Q |
| 1,1-Dichloroethene | 9.107E-03 | 6.696E-03 | 2.992E-05 | 8.549E-06 | 1.357E-02 | 1.640E-07 | 3.393E-03 |
| Dichloromethane | 2.102E-01 | 5.722E-03 | 2.538E-03 | 7.251E-04 | 1.151E+00 | 1,391E-05 | 2.878E-01 |
| 3-Chloropropene | 2.754E-03 | 2.754E-03 | QN | Q | QN | Q. | QN |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 4.799E-03 | 5.750E-03 | QN | Q. | QN | ΩN | Q |
| 1,1-Dichloroethane | 3.159E-03 | 3.159E-03 | DN | QN | ND | Q. | Ð |
| cis-1,2-Dichloroethene | 3.295E-03 | 3.295E-03 | QN | Q | QN | Q. | Q |
| Trichloromethane | 4.099E-03 | 4.099E-03 | QN | QN | QN | ON O | Q |
| 1,2-Dichloroethane | 3.443E-03 | 3.443E-03 | S | Q | QN | QN | Q |
| 1,1,1-Trichloroethane | 3.272E-02 | 1.095E-01 | QN | Q | QN | QN | 2 |
| Benzene | 5.900E-02 | 2.329E-03 | 7.322E-04 | 2.092E-04 | 3.321E-01 | 4.013E-06 | 8,303E-02 |
| Carbon Tetrachloride | 4.529E-03 | 4.529E-03 | Q | Q | QN | QN | Q |
| 1,2-Dichloropropane | 3.419E-03 | 3.419E-03 | QN | Q | QN | QN | QN |
| Trichloroethene | 3.866E-03 | 3.866E-03 | ND | Q | QN | QN | QN |
| cis-1,3-Dichloropropene | 3.360E-03 | 3.360E-03 | Q | Q | QN | QN | Q |
| trans-1,3-Dichloropropene | 2.860E-03 | 2.860E-03 | QQ | 2 | ON | Q | Q |
| 1,1,2-Trichloroethane | 3.877E-03 | 3.877E-03 | Q | 2 | ON | QN | QN |
| Toluene | 6.492E-03 | 3.610E-03 | 3.577E-05 | 1.022E-05 | 1.622E-02 | 1.960E-07 | 4,056E-03 |
| 1,2-Dibromoethane | 5.844E-03 | 5.844E-03 | 2 | 2 | QN | Q | Q |
| Tetrachloroethene | 4.475E-03 | 4.475E-03 | 2 | QN | QN | QN | QN |

Table B-37: Air Modeling Output Data for Volatile Organic Compounds - 200 meter location

| | 155mm pi | ropelling charge DODIO | 155mm propelling charge M3A1 (zone 3), M199 cannon DODIC: D540 | 99 cannon | No. of rounds (I) release duration (t): | 1 4 | rounds |
|---------------------------|----------------------------------|---|--|-------------------------------------|---|--|---|
| | N | t Explosive Weight (NEW) in ibs Number of items = 1 SF6 Leak Rate Dilution Factor | Net Explosive Weight (NEW) in lbs. => Number of items = 1 SF6 Leak Rate Dilution Factor => | 3.50 0.93 | Unit Concentration (UC): | 4.833E-05 | 4.833E-05 (g/m³)/(g/s) |
| | | The state of the second | STORY STORY | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background | Average Adjusted Emission Factor | Average Adjusted Emission Factor | Emitted (grams/item) | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) |
| | (mg/m³) | (mg/m³) | EF | (Ib/Ib NEW) | W | CONC | ER, |
| Chlorobenzene | 2.305E-04 | 2.305E-04 | QN | QN | QN | ΩN | QN |
| Ethylbenzene | 2.344E-03 | 2.344E-03 | QN | QN | ND | QN | QN |
| m&p-Xylene | 2.257E-03 | 2.257E-03 | QN | QN | ON | QN | QN |
| Styrene | 2.641E-03 | 2.641E-03 | 임 | Q | ON | ND | QN |
| 1,1,2,2-Tetrachloroethane | 4.466E-03 | 4.466E-03 | QN | QN | QN | QN | S |
| o-Xylene | 2.474E-03 | 2.474E-03 | QN | QN | ON | ON | QN |
| 4-Ethyltoluene | 2.214E-03 | 2.214E-03 | QN | QN | ON | ND | ON |
| 1,3,5-Trimethylbenzene | 2.460E-03 | 2.460E-03 | QN | Q | · QN | QN | QN |
| 1,2,4-Trimethylbenzene | 2.312E-03 | 2.312E-03 | ON | QN | QN | N | QN |
| Benzyl Chloride | 5.076E-03 | 5.076E-03 | QN | QN | ND | QN. | QN |
| m-Dichlorobenzene | 3.366E-03 | 3.366E-03 | ND | QN | QN | QN | QN |
| p-Dichlorobenzene | 2.945E-03 | 2.945E-03 | QN | QN | QN | 9 | S |
| o-Dichlorobenzene | 3.606E-03 | 3.606E-03 | QN | QN | QN | S | QN |
| 1,2,4-Trichlorobenzene | 4.526E-03 | 4.526E-03 | QN | ΩN | QN | ND | QN |
| Hexachlorobutadiene | 4.690E-03 | 4.690E-03 | 2 | 2 | QN | QN | QN |
| Methane | 2.222E+00 | 1.364E+00 | 1.065E-02 | 3.043E-03 | 4.831E+00 | 5.837E-05 | 1.208E+00 |
| Ethane | 6.764E-01 | 6.764E-01 | QN | QN | ND | ND | QN |
| Ethylene | 6.310E-01 | 6.310E-01 | Q | QN | ND | QN | ΩN |
| Propane | 9.920E-01 | 9.920E-01 | QN | SO | QN | QN | QN |
| Acetylene | 5.858E-01 | 5.858E-01 | QN | ON | ON | QN | QN |
| Isobutane | 1.307E+00 | 1.307E+00 | ND | QN | QN | ON | S |
| n-Butane | 1.307E+00 | 1.307E+00 | QN | QN | QN | S | S |
| Propylene | 9.466E-01 | 9.466E-01 | ND | QN | ND | ND | QN |
| Footnotes: | | | | | | | |

Table B-38: Air Modeling Output Data for Semi-Volatile Organic Compounds - 200 meter location

| | 155mm pronel | ronelling charge | ling charge M3A1 (zone 3). M199 cannon | 99 cannon | No of rounds (1) | 7 | rounds |
|-----------------------------|----------------------------------|---|--|-------------------------------------|--------------------------|--|---|
| | | laoa | DODIC: D540 | | release duration (t): | 4 | seconds |
| | eN. | Net Explosive Weigh | osive Weight (NEW) in lbs. => | 3.50 | Unit Concentration (UC): | 4.833E-05 | 4.833E-05 (g/m³)/(g/s) |
| | | Number or SF6 Leak Rate D | Number of Items = 1 Leak Rate Dilution Factor => | 0.93 | | | |
| | | indulations. | MOTERING WATERWATER | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background Concentration | Average Adjusted Emission Factor (Ib/Item) | Average Adjusted Emission Factor | Emitted (grams/ilem) | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) |
| | (mg/m²) | (mg/m ₃) | EF | (ib/lb NEW) | Ψ | CONC | ER, |
| SVOCs | | | | | | | |
| n-nitrosodimethylamine | 2.829E-03 | 5.605E-05 | ΩN | QN | QN | QV | QN |
| bls(2-chloroethyl)ether | 2.829E-03 | 5.605E-05 | QN | QN | QN | QN | QN |
| phenol | 2.100E-02 | 7.120E-03 | 1.722E-04 | 4.921E-05 | 7.812E-02 | 9.439E-07 | 1.953E-02 |
| 2-chlorophenol | 2.829E-03 | 5.605E-05 | QN | QN | ON | ND | QN |
| 1,3-dichlorobenzene | 2.829E-03 | 5.605E-05 | Q | QN | ND | ND | QN |
| 1,4-dichlorobenzene | 2.829E-03 | 5.664E-05 | Q. | ᄝ | ND | ON | QN |
| 1,2-dichlorobenzene | 2.829E-03 | 5.605E-05 | 9 | QD | ND | QN | QN |
| benzyi alcohol | 2.829E-03 | 5.605E-05 | QN | QN | QN | QN | QN |
| bis(2-chloroisopropyl)ether | 2.829E-03 | 5.605E-05 | QN | QN | QN | QN | S |
| 2-methylphenol | 2.829E-03 | 5.605E-05 | QN | GN | QN | QN | QN |
| hexachloroethane | 2.829E-03 | 5.605E-05 | QN | GN | QN | QN | Q |
| n-nitroso-dl-n-propylamine | 2.829E-03 | 5.605E-05 | QN | QN | ON | N O | Q |
| 4-methylphenol | 2.829E-03 | 5.605E-05 | QN | QN | QN | QN | Q |
| nitrobenzene | 2.829E-03 | 5.605E-05 | QN | QN | QN | QN | QN |
| Isophorone | 2.829E-03 | 5.605E-05 | 2 | QN | ON | QN | QN |
| 2-nitrophenol | 2.829E-03 | 3.660E-04 | 2 | Q | ND | ND | QN |
| 2,4-dimethylphenol | 2.829E-03 | 5.605E-05 | 9 | Q. | ON | QN | ON |
| bis(2-chloroethoxy)methane | 2.829E-03 | 5.605E-05 | 9 | Q | ON | QN | QN |
| 2,4-dichlorophenol | 2.829E-03 | 5.605E-05 | 2 | Q. | ND | QN | QN |
| 1,2,4-trichlorobenzene | 2.829E-03 | 5.605E-05 | Q | ON | ON | QN | QN |
| naphthalene | 3.112E-03 | 1.366E-04 | 3.693E-05 | 1.055E-05 | 1.675E-02 | 2.024E-07 | 4.187E-03 |
| 4-chloroaniline | 2.829E-02 | 5.605E-04 | QN | QN | ND | DN | QN |
| hexachlorobutadiene | 2.829E-03 | 5.605E-05 | Q | Q | ND | QN | QN |
| 4-chloro-3-methylphenol | 2.829E-03 | 5.605E-05 | 2 | 2 | ND | ON | QN |
| 2-methylnaphthalene | 2.829E-03 | 1.694E-04 | 2 | Q | ON | QN | QN |
| hexachlorocyclopentadiene | 2.829E-03 | 5.605E-05 | Q | Q | QN. | DN | QN |
| 2,4,6-trichlorophenol | 2.829E-03 | 5.605E-05 | QQ | QN | QN | QN | ND |

Table B-38: Air Modeling Output Data for Semi-Volatile Organic Compounds - 200 meter location

| | 155mm propel | ropelling charge I | lling charge M3A1 (zone 3), M199 cannon DODIC: D540 | 99 cannon | No. of rounds (I) release duration (t): | L 4 | 1 rounds 4 seconds |
|----------------------------|-------------------------------|---|---|--|---|--|---|
| | θV | Net Explosive Weighi Number o SF6 Leak Rate D | losive Weight (NEW) in ibs. => Number of items = 1 Leak Rate Dilution Factor => | 3.50 0.93 | Unit Concentration (UC): | 4.833E-05 | 4.833E-05 (g/m³)/(g/s) |
| | | Wilder Hand | Stephing workstill Se | Victoria de la constante de la | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background Concentration | Average Adjusted Emission Factor (lb/litem) | Average Adjusted Emission Factor (Ib/Ib NEW) | Emitted (grams/item) | Concentration for One Round (grams/m³) | Emission Kate for One Round (g/sec) |
| | , | (mg/m ₃) | EF | | ₩. | CONC | ER, |
| 2,4,5-trichlorophenol | 2.829E-03 | 2.605E-05 | ΩN | QN | QN | QN | QΝ |
| 2-chloronaphthalene | 2.829E-03 | 5.605E-05 | QN | QN | QN | QN | QN |
| 2-nitroaniline | 2.829E-03 | 5.605E-05 | QN | QN | QN | QN | QN |
| dimethylphthalate | 2.829E-03 | 5.605E-05 | QN | QN | QN | QN | QN |
| 2,6-dinitrotoluene | 2.829E-03 | 5.721E-05 | QN | QN | QN | QN | QN |
| 3-nitroaniline | 5.658E-03 | 1.121E-04 | QN | QN | QN | ΩN | QN |
| 2,4-dinitrophenol | 5.658E-03 | 1.121E-04 | QN | QN | QN | QN | QN |
| dibenzofuran | 2.829E-03 | 7.823E-05 | ΩN | <u>Q</u> | ND | QN | ND |
| 2,4-dinItrotoluene | 2.829E-03 | 5.605E-05 | QN | QN | QN | QN | QN |
| 4-nitrophenol | 5.658E-03 | 1.316E-04 | QN | QN | QN | ΩN | QN |
| 4-chlorophenyl-phenylether | 2.829E-03 | 5.605E-05 | ON | QN | QN | ΩN | QN |
| diethyiphthalate | 2.829E-03 | 5.605E-05 | ON | QN | QN | QN | QN |
| 4-nitroanIlIne | 5.658E-03 | 1.121E-04 | ΩN | QN | QN | QN | QN |
| 4,6-dinitro-2-methylphenol | 5.658E-03 | 1.121E-04 | Q | QN | ND | QN | QN |
| n-nitrosodiphenylamine(1) | 2.829E-03 | 5,605E-05 | 2 | Q | ND | QN | DN |
| 4-bromophenyl-phenylether | 2.829E-03 | 5,605E-05 | QN. | QN | ND | QN | QN |
| hexachlorobenzene | 2.829E-03 | 5,605E-05 | QN | QN | ND | QN | QN |
| pentachlorophenol | 5.658E-03 | 1.121E-04 | S | Q | ON | QN | QN |
| di-n-butylphthalate | 2.829E-03 | 1.080E-04 | QN | QN | ND | QN | QN |
| butylbenzylphthalate | 2.829E-03 | 5.605E-05 | ND | QN | QN | ΩN | QN |
| bis(2-ethylhexyl)phthalate | 2.829E-03 | 5.605E-05 | ON | 9 | ND | QN | ON |
| di-n-octylphthalate | 2.829E-03 | 5.605E-05 | ND | QN | ND | QN | QN |
| Footnotes: | | | | | | | |

Table B-39: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases 200 meter location

| | l | 40 2011 | PAR 10 cacal backs | 100,000,00 | (1) obtained to old | _ | opario |
|------------------------|-----------------------|------------------------------------|--|--------------------------------|--------------------------|-----------------------------|-----------------------------|
| | nedoud www. | ropening charge | ing charge waal (zone a), wilss cannon | as cannon | NO. OI TOURING (1) | | spiinoi |
| | | Idoa | DODIC: D540 | | release duration (t): | 4 | seconds |
| | Ne | Net Explosive Weight (NEW) in Ibs. | t (NEW) in lbs. => | 3.50 | Unit Concentration (UC): | 4.833E-05 | 4.833E-05 (g/m³)/(g/s) |
| | | Number | Number of items = 1 | | | | |
| | | SF6 Leak Rate D | Leak Rate Dilution Factor => | 0.93 | | | |
| | | Principles | Wentling of the Comme | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual | Measured | Average Adjusted | Average Adjusted | Emitted (grams/item) | Concentration for One Round | Emission Rate for One Round |
| | Concentration (mg/m³) | Concentration (mg/m³) | (lb/ltem) EF | Emission Factor (lb/lb NEW) | Σ | (grams/m²) CONC | (g/sec) ER, |
| PAHs (TO-13 Method) | | | | | | | |
| acenaphthylene | 4.910E-04 | 1.328E-06 | 6.076E-06 | 1.736E-06 | 2.756E-03 | 3,330E-08 | 6.890E-04 |
| acenaphthene | 1.507E-04 | 9.544E-05 | 6.854E-07 | 1.958E-07 | 3.109E-04 | 3.756E-09 | 7,772E-05 |
| fluorene | 2.571E-04 | 6.502E-05 | 2.383E-06 | 6.810E-07 | 1.081E-03 | 1.306E-08 | 2.703E-04 |
| phenanthrene | 3.933E-04 | 6.428E-05 | 4.083E-06 | 1.167E-06 | 1.852E-03 | 2.238E-08 | 4.630E-04 |
| anthracene | 4,472E-05 | 4.197E-06 | 5.028E-07 | 1.437E-07 | 2.281E-04 | 2.756E-09 | 5.702E-05 |
| fluoranthene | 1.899E-04 | 7.852E-06 | 2.259E-06 | 6.455E-07 | 1.025E-03 | 1.238E-08 | 2.562E-04 |
| pyrene | 4.444E-04 | 6.908E-06 | 5.429E-06 | 1.551E-06 | 2.463E-03 | 2.975E-08 | 6.157E-04 |
| benzo(a)anthracene | 2.472E-05 | 1.390E-07 | 3.051E-07 | 8.716E-08 | 1.384E-04 | 1.672E-09 | 3.459E-05 |
| chrysene | 3.038E-05 | 3.878E-07 | 3.722E-07 | 1.063E-07 | 1.688E-04 | 2.040E-09 | 4.221E-05 |
| benzo(b)fluoranthene | 8.760E-05 | 2.220E-07 | 1.084E-06 | 3.098E-07 | 4.919E-04 | 5.943E-09 | 1.230E-04 |
| benzo(k)fluoranthene | 5.658E-05 | 9.826E-08 | 7.010E-07 | 2.003E-07 | 3.179E-04 | 3.842E-09 | 7.949E-05 |
| benzo(a)pyrene | 1.118E-04 | 8.980E-08 | 1.386E-06 | 3.960E-07 | 6.287E-04 | 7.597E-09 | 1.572E-04 |
| indeno(1,2,3-cd)pyrene | 1.997E-04 | 1.659E-07 | 2.476E-06 | 7.074E-07 | 1.123E-03 | 1.357E-08 | 2.807E-04 |
| dibenz(a,h)anthracene | 6.252E-06 | 5.605E-08 | 7.758E-08 | 2.217E-08 | 3.519E-05 | 4.252E-10 | 8.798E-06 |
| benzo(g,h,l)perylene | 3.906E-04 | 2.408E-07 | 4.844E-06 | 1.384E-06 | 2.197E-03 | 2.655E-08 | 5.493E-04 |
| Dioxin/Furan Data | | | | | | | |
| 2378-TCDD | 3.445E-10 | 8.000E-12 | QN | Q | QN | QN | QN |
| 12378-PECDD | 3.440E-10 | 9.000E-12 | 4.157E-12 | 1.188E-12 | 1.886E-09 | 2.278E-14 | 4.714E-10 |
| 123478-HXCDD | 4.715E-10 | 1.050E-11 | ON LY | ON CO | UN COLLOS | ON CALL | UN 1949 |
| 123078-FIXCUU | 9.090E-10 | 1.7000-11 | 1,101,1 | 0.0705-12 | 9.339E-08 | 7.0047 | 1.3401-09 |
| 123789-HXCDD | 1.080E-09 | 1.55UE-11 | 1.328E-11 | 3.790E-12 | 6.026E-09 | 7.281E-14 | 1.506=09 |
| 1234678-HPCDD | 9.763E-09 | 2.495E-10 | 1.181E-10 | 3.373E-11 | 5.355E-08 | 6.470E-13 | 1.339E-08 |
| ocop | 3.881E-08 | 1.587E-09 | 4.619E-10 | 1.320E-10 | 2.095E-07 | 2.532E-12 | 5.238E-08 |
| 2378-TCDF | 5.095E-10 | 1.100E-11 | Q | 2 | ND | S | QN |
| 12378-PECDF | 2.885E-10 | 1.050E-11 | QN | QN | ND | QN | QN |
| 23478-PECDF | 1.595E-10 | 1,550E-11 | 운 | 2 | QN | S | Q |
| 123478-HXCDF | 1.980년-10 | 2.800E-11 | 2.110E-12 | 6,028E-13 | 9.569 E-1 0 | 1.156E-14 | 2.392E-10 |
| 123678-HXCDF | 1.525E-10 | 1.450E-11 | Q | Q | QN | QN | 2 |
| 123789-HXCDF | 2.730E-10 | 6.000E-12 | Q | Q. | QN | QN | QV |
| | | | | | | | |

1/16/01

Table B-39: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases 200 meter location

| | 155mm p | ropelling charge | 155mm propelling charge M3A1 (zone 3), M199 cannon | 99 cannon | No. of rounds (I) | _ | rounds |
|--------------------------|-----------------------|--|--|--------------------------------|--------------------------|-------------------|------------------------|
| | | DOD | DODIC: D540 | | release duration (t): | 4 | seconds |
| | Ne | Net Explosive Weigh | plosive Weight (NEW) in lbs. => | 3.50 | Unit Concentration (UC): | 4.833E-05 | 4.833E-05 (g/m³)/(g/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 ak Rate Dilution Factor => | 0.93 | | | |
| | | A Valor and the real filters | | | Total Mass of Substance | Average Modeled | Substance |
| | | | | | Emitted | Concentration for | Emission Rate for |
| Compound | Measured Actual | Measured | Average Adjusted Emission Factor | Average Adjusted | (grams/item) | One Round | One Round |
| | Concentration (mg/m³) | Concentration (mg/m³) | (lb/item) EF | Emission Factor (lb/lb NEW) | Σ | (grams/m.) | (g/sec) ER, |
| 234678-HXCDF | 2.255E-10 | 1.200E-11 | QN | QN | QN | QN | CN |
| 1234678-HPCDF | 7.025E-10 | 7.750E-11 | 7.756E-12 | 2.216E-12 | 3.518E-09 | 4.251E-14 | 8.795E-10 |
| 1234789-HPCDF | 2.635E-10 | 8.000E-12 | Q | Q | QN | QN | QN. |
| OCDF | 1.347E-09 | 1.105E-10 | 1.534E-11 | 4.384E-12 | 6.960E-09 | 8,410E-14 | 1.740E-09 |
| Aldehydes | | | | | | | |
| Formaldehyde | 1.228E-02 | 1.228E-02 | QN | QN | QN | QN | QN |
| Acetaldehyde | 1.802E-02 | 1.802E-02 | QN | QN | QN | S | QN |
| Acetone | 2.375E-02 | 4.751E-02 | QN | QN | QN | QN | QN |
| Acrolein | 2.294E-02 | 2.294E-02 | QN | QN | QN | QN | QN |
| Proprionaldehyde | 2.374E-02 | 2.374E-02 | Q | QN | QN | QN | Q |
| Crotonaldehyde | 2.867E-02 | 2.867E-02 | QN. | QN | ON | QN | QN |
| Butyraldehyde | 2.949E-02 | 2.949E-02 | Q | ON | QN | QN | QN |
| Benzaldehyde | 4.340E-02 | 4.340E-02 | Q | QN | ON | QV | QN |
| Isovaleraldehyde | 3.523E-02 | 3.523E-02 | Q | QN | ON | QN | QN |
| Valeraldehyde | 3.523E-02 | 3.523E-02 | Q | QN | ON | QN | QN |
| o,m,p-Tolualdehyde | 9.828E-02 | 9.828E-02 | Q | QN | ON | QN | ND |
| Hexaldehyde | 4.097E-02 | 4.097E-02 | Q | Q | QN | ND | QN |
| 2,5-Dimethylbenzaldehyde | 4.097E-02 | 4.097E-02 | Q | Q | ND | QN | Q |
| Acid gases | | | | | | | |
| Hydrogen fluoride | 1.400E-01 | 1.400E-01 | QN | Q | ON | QN | QN |
| Hydrogen chloride | 1.300E-01 | 1.300E-01 | QN | QN | ON | QN | QN |
| Hydrogen bromide | 1.400E-01 | 1.400E-01 | Q | QN | ON | ND | QN |
| Nitric Acid | 1.400E-01 | 1.400E-01 | Q | 9 | ND | QN | Q. |
| Phosphoric acid | 1.400E-01 | 1.400E-01 | <u>Q</u> | Q | ON | ND | QN |
| Sulfuric Acid | 1.400E-01 | 1.400E-01 | ON. | QN | ON | ND | QN |
| Footnotes: | ę ę | | | | | | |

¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

Table B-40; Air Modeling Output Data for Cyanide and Energetics - 200 meter location

| Compound Compound | | 155mm propel | ropelling charge DODI | ling charge M3A1 (zone 3), M199 cannon DODIC: D540 | 99 cannon | No. of rounds (!) release duration (t): | - 4 | rounds seconds |
|--|-----------------------------|---|---|--|--|---|-----------------|---|
| Compound Measured Actual Measured Actual Measured Actual Concentration Concentrati | | θŽ | | | 3.50 | Unit Concentration (UC): | 4.833E-05 | (a/m ₃)/(g/s) |
| Compound Compoun | | | SF6 Leak Rate D | 1 | 0.93 | | | |
| Compound Concentration Concentration Concentration Concentration Concentration Concentration Concentration (mg/m³) (mg/m³) Average Adjusted Factor (mg/m³) (mg/m³) (mg/m³) Average Adjusted Emission Factor (mg/m³) (mg/m³) (mg/m³) Average Adjusted (grams/flem) (grams/flem) (grams/flem) (grams/flem) (mg/m³) (mg/m³) Average Adjusted (grams/flem) (grams/flem) (grams/flem) (mg/m³) (mg/m³) Average Adjusted (mg/m³) | | 10.00 | | N. LOSTON AND R. P. | A de la la la companya de la Constitución de la companya de la com | Total Mass of Substance | Average Modeled | Substance Emission Date for |
| culate Cyanide and HCN 8.000E-02 ND ND ND culate Cyanide of Cyanide Cyanide Cyanide Cyanide Cyanide Cyanide Cyanide Cyanide Signo Cyanide Sig | Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (lb/item) EF | Average Adjusted Emission Factor (lb/lb NEW) | (grams/item) | (grams/m³) | One Round (g/sec) ER ₁ |
| culate Cyanide 8.000E-02 8.000E-02 ND ND ND ND ogen Cyanide 3.800E-01 8.500E-02 4.746E-03 4.746E-03 4.746E-03 2.034E-05 PD openicial openici | Particulate Cyanide and HCN | | | | ٠ | | | |
| Ogen Cyanide 3300E-01 6.500E-02 4.716E-03 1.347E-03 2.139E+00 2.594E-05 gelics Data 4.740E-01 2.031E-01 ND ND ND ND benzene 4.740E-01 2.031E-01 ND ND ND ND rotoluene 4.740E-01 2.031E-01 ND ND ND ND rotoluene 4.740E-01 2.031E-01 ND ND ND ND glyseline 4.740E-01 2.031E-01 ND ND ND ND plintorlouene 4.740E-01 2.031E-01 ND ND ND ND | Particulate Cyanide | 8.000E-02 | 8.000E-02 | QN | QN | QN | QN | ON. |
| getics Data At 740E-01 2.031E-01 ND ND ND benzene 4,740E-01 2.031E-01 ND ND ND ND benzene 4,740E-01 2.031E-01 ND ND ND ND rotoluene 4,740E-01 2.031E-01 ND ND ND ND rotoluene 4,740E-01 2.031E-01 ND ND ND ND rotoluene 4,740E-01 2.031E-01 ND ND ND ND plinitrobenzane 4,740E-01 2.031E-01 ND ND ND ND plinitroblenzane 4,740E-01 2.031E-01 ND ND ND ND plinitroblenzane <td< td=""><td>Hydrogen Cyanide</td><td>3.800E-01</td><td>8.500E-02</td><td>4.716E-03</td><td>1.347E-03</td><td>2.139E+00</td><td>2.584E-05</td><td>5,348E-01</td></td<> | Hydrogen Cyanide | 3.800E-01 | 8.500E-02 | 4.716E-03 | 1.347E-03 | 2.139E+00 | 2.584E-05 | 5,348E-01 |
| Denzene 4.740E-01 2.031E-01 ND ND ND ND rotoluene 4.740E-01 2.031E-01 ND ND ND ND rotoluene 4.740E-01 2.031E-01 ND ND ND ND glyceline 4.740E-01 2.031E-01 ND ND ND ND glyceline 4.740E-01 2.031E-01 ND ND ND ND plintrobluene | Energetics Data | | | | | | | |
| rotoluene 4,740E-01 2,031E-01 ND ND ND ND rotoluene 4,740E-01 2,031E-01 ND ND ND ND rotoluene 4,740E-01 2,031E-01 ND ND ND ND glycerine 4,740E-01 2,031E-01 ND ND ND ND pinitrotoluene 4,740E-01 2,031E-01 ND ND ND ND pino-2,6-Dinitrotoluene 4,740E-01 2,031E-01 ND ND ND ND <td< td=""><td>Nitrobenzene</td><td>4.740E-01</td><td>2.031E-01</td><td>QN</td><td>QN</td><td>ND</td><td>QN</td><td>Q</td></td<> | Nitrobenzene | 4.740E-01 | 2.031E-01 | QN | QN | ND | QN | Q |
| rotoluene 4,740E-01 2,031E-01 ND ND ND ND rotoluene 4,740E-01 2,031E-01 ND ND ND ND glycerine 4,740E-01 2,031E-01 ND ND ND ND Julitrobenzene 4,740E-01 2,031E-01 ND ND ND ND Julitrobenzene 4,740E-01 2,031E-01 ND ND ND ND Julitrobluene 4,740E-01 2,031E-01 ND ND ND ND -Trinitrobluene 4,740E-01 2,031E-01 ND ND ND ND -Trinitrobluene 4,740E-01 2,031E-01 ND ND ND ND -Trinitrobluene 4,740E-01 2,031E-01 ND ND ND ND Ininc-2,6-Dinitrobluene 4,740E-01 2,031E-01 ND ND ND ND Ary Sector 2,031E-01 ND ND ND ND ND Ary | 2-Nitrotoluene | 4.740E-01 | 2.031E-01 | ND | ON | ND | QN | Ω |
| rotoluene 4,740E-01 2.031E-01 ND ND ND ND glycerine 4,740E-01 2.031E-01 ND ND ND ND ND pinlirotoluene 4,740E-01 2.031E-01 ND ND ND ND pinlirotoluene 4,740E-01 2.031E-01 ND ND ND ND pinlirotoluene 4,740E-01 2.031E-01 ND ND ND ND pinlo-2,6-Dinlirotoluene 4,740E-01 2.031E-01 ND ND ND ND pino-2,6-Dinlirotoluene 4,740E-01 2.031E-01 ND ND | 3-Nitrotoluene | 4.740E-01 | 2.031E-01 | QN | ΩN | ON | QN | QN |
| glycerine 4,740E-01 2.031E-01 ND ND ND ND Jinitrobenzene 4,740E-01 2.031E-01 ND ND ND ND Jinitrobluene 4,740E-01 2.031E-01 ND ND ND ND Jinitrobluene 4,740E-01 2.031E-01 ND ND ND ND Trinitrobluene 4,740E-01 2.031E-01 ND ND ND ND Trinitrobluene 4,740E-01 2.031E-01 ND ND ND ND Trinitrobluene 4,740E-01 2.031E-01 ND ND ND ND Ininc-2,6-Dinitrobluene 4,740E-01 2.031E-01 ND ND ND ND Ininc-4,6-Dinitrobluene 4,740E-01 2.031E-01 ND ND ND ND Ininc-4,6-Dinitrobluene 4,740E-01 2.031E-01 ND ND ND ND Ininc-4,6-Dinitrobluene 4,740E-01 2.031E-01 ND ND ND | 4-Nitrotoluene | 4.740E-01 | 2.031E-01 | QN | QN | ND | QN | ND |
| Dinitrobenzene 4.740E-01 2.031E-01 ND < | Nitroglycerine | 4.740E-01 | 2.031E-01 | QN | QN | ON | ON | QN |
| Dinitrotoluene 4.740E-01 2.031E-01 ND ND ND ND Dinitrotoluene 4.740E-01 2.031E-01 ND ND ND ND Infiltrotoluene 4.740E-01 2.031E-01 ND ND ND ND Info-2,6-Dinitrotoluene 4.740E-01 2.031E-01 ND ND ND ND Info-2,6-Dinitrotoluene 4.740E-01 2.031E-01 ND ND ND ND Info-2,6-Dinitrotoluene 4.740E-01 2.031E-01 ND ND ND ND Info-4,6-Dinitrotoluene 4.740E-01 2.031E-01 ND | 1,3-Dinitrobenzene | 4.740E-01 | 2.031E-01 | QN | QN | ON | QN | QN |
| Dinitrotoluene 4.740E-01 2.031E-01 ND < | 2,6-Dinitrotoluene | 4.740E-01 | 2.031E-01 | QN | QN | ON | ON | QN |
| -Trinitrobenzene 4.740E-01 2.031E-01 ND ND ND ND -Trinitroblene 4.740E-01 2.031E-01 ND ND ND ND ND nino-2,6-Dinitrobluene 4.740E-01 2.031E-01 ND ND ND ND ND nino-4,6-Dinitrobluene 4.740E-01 2.031E-01 ND ND ND ND ND no-4,6-Dinitrobluene 9.481E-01 4.062E-01 ND ND ND ND ND ND nyl phthalate 2.370E+01 1.016E+01 ND ND ND ND ND ND nyl phthalate 2.370E+01 1.016E+01 ND ND <td>2,4-Dinitrotoluene</td> <td>4.740E-01</td> <td>2.031E-01</td> <td>QN</td> <td>GN</td> <td>ON</td> <td>QN</td> <td>QN</td> | 2,4-Dinitrotoluene | 4.740E-01 | 2.031E-01 | QN | GN | ON | QN | QN |
| -Trinlitrotoluene 4,740E-01 2.031E-01 ND ND ND ND nino-2,6-Dinitrotoluene 4,740E-01 2.031E-01 ND ND ND ND nino-4,6-Dinitrotoluene 4,740E-01 4.062E-01 ND ND ND ND nino-4,6-Dinitrotoluene 9,481E-01 4.062E-01 ND ND ND ND nino-4,6-Dinitrotoluene 2,370E+01 4.062E-01 | 1,3,5-Trinitrobenzene | 4.740E-01 | 2.031E-01 | QN | QV. | ON | QN | QN |
| 4.740E-01 2.031E-01 ND ND ND ND nino-2,6-Dinitrotoluene 4.740E-01 2.031E-01 ND ND ND ND ilno-4,6-Dinitrotoluene 4.740E-01 ND ND ND ND ND ilno-4,6-Dinitrotoluene 4.740E-01 4.062E-01 ND ND ND ND ilno-4,6-Dinitrotoluene 9.481E-01 4.062E-01 ND ND ND ND ilno-4,6-Dinitrotoluene 9.481E-01 4.062E-01 ND ND | 2,4,6-Trinitrotoluene | 4.740E-01 | 2.031E-01 | QN | QN | ND | ON | QN |
| 4,740E-01 2.031E-01 ND ND ND ND 4,740E-01 2.031E-01 ND ND ND ND 4,740E-01 2.031E-01 ND ND ND ND 9,481E-01 4.062E-01 ND ND ND ND 2,370E+01 1.016E+01 ND ND ND ND 2,370E+01 1.016E+01 ND ND ND ND 1,185E+01 5.078E+00 ND ND ND ND | RDX | 4.740E-01 | 2.031E-01 | QN | QN | QN | 2 | Q. |
| no-4,6-Diritrotoluene 4.740E-01 2.031E-01 ND ND ND ND erythritoltetranitrate 9.481E-01 4.062E-01 ND ND ND ND ND I phthalate 2.370E+01 1.016E+01 ND ND ND ND I phthalate 2.370E+01 1.016E+01 ND ND ND ND I phthalate 2.370E+01 1.016E+01 ND ND ND ND | 4-Amino-2,6-Dinitrotoluene | 4.740E-01 | 2.031E-01 | Q | Q | ON | ON. | Q |
| 4,740E-01 2.031E-01 ND | 2-Amino-4,6-Dinitrotoluene | 4.740E-01 | 2.031E-01 | QN | QN | ND | QN | QN |
| 9.481E-01 4.062E-01 ND | Tetryl | 4.740E-01 | 2.031E-01 | QN | QN | ΩŃ | QN | QN |
| 9.481E-01 4.062E-01 ND ND< | HMX | 9.481E-01 | 4.062E-01 | QN | QN | ON | QN | QN |
| 2.370E+01 1.016E+01 ND ND ND 2.370E+01 1.016E+01 ND ND ND 1.185E+01 5.078E+00 ND ND ND | Pentaerythritoltetranitrate | 9.481E-01 | 4.062E-01 | QN | QN | ON | ON | QN |
| 2.370E+01 1.016E+01 ND ND ND ND 1.185E+01 5.078E+00 ND ND ND | Dibutyl phthalate | 2.370E+01 | 1.016E+01 | QN | QN | ON | QN | QN |
| 1.185E÷01 5.078E÷00 ND ND ND ND | Dioctyl phthalate | 2.370E+01 | 1.016E+01 | QN | Q | NO | QN | QN |
| | Diphenylamine | 1.185E+01 | 5.078E+00 | QV | Q | ND | Q | ND |

^{&#}x27;ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study)
ND = Not Detected

AIR MODELING OUTPUT DATA FOR CHARGE M3A1, FIRED FROM THE M284 CANNON, ZONE 3, 100 METERS DOWNWIND

Table B-41: Air Modeling Output Data for Gases, Metals, and Particulates - 100 meter location

| | d mmccr | ropelling charge | 155mm propelling charge M3A1 (20ne 3), M284 cannon | 84 cannon | No. of rounds (1) | | rounds |
|---|---------------------------------------|---|--|--|--------------------------|--|---|
| | | Idoa | DODIC: D540 | | release duration (t): | 2 | seconds |
| | θN | Net Explosive Weigh | plosive Weight (NEW) in lbs. => | 3.50 | Unit Concentration (UC): | 9.348E-05 | 9.348E-05 (g/m³)/(g/s) |
| | | Number - SF6 Leak Rate D | Number of Items = 1 ak Rate Dilution Factor => | 0.932 | | | |
| | | Seesance (FIGURETTE STORY) THE | we publicate the property | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mo/m³) | Measured Background Concentration | Average Adjusted Emission Factor (ib/item) | Average Adjusted Emission Factor (lb/lb NEW) | Emitted (grams/item) | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) |
| | | (mg/m²) | Ţ | | W | CONC | ER, |
| Gases | | | | | | | |
| NH3 | 5.530E+00 | NA | 6.382E-02 | 1.824E-02 | 2.895E+01 | 1.353E-03 | 1.447E+01 |
| CO2 | 6.120E+01 | NA | 7.063E-01 | 2.018E-01 | 3.204E+02 | 1.497E-02 | 1.602E+02 |
| 00 | 1.656E+02 | NA | 1.911E+00 | 5.461E-01 | 8.669E+02 | 4.052E-02 | 4.335E+02 |
| NOx (as NO) | 2.952E+00 | NA | 3.407E-02 | 9.734E-03 | 1.545E+01 | 7.223E-04 | 7.727E+00 |
| CH4 | 2.178E+00 | NA | QN | QN | QN | QN. | QN |
| SO2 | 5.240E-01 | NA | ΩN | QN | QN | 2 | QN |
| Combined Particulate | | | | | | | |
| TSP | 5.510E+00 | 5.300E-02 | 6.758E-02 | 1.931E-02 | 3.065E+01 | 1.433E-03 | 1.533E+01 |
| PM10 | 4.875E+00 | 4.233E-02 | 5.984E-02 | 1.710E-02 | 2.714E+01 | 1,269E-03 | 1.357E+01 |
| PM2.5 | 2.731E+00 | 2.400E-02 | 3.352E-02 | 9.578E-03 | 1.520E+01 | 7.107E-04 | 7.602E+00 |
| Metals | | | | | | | |
| Antimony | 1.872E-04 | 4.345E-06 | QN | QN | QN | S | QN |
| Arsenic | 1.895E-04 | 3.091E-06 | 2.308E-06 | 6.594E-07 | 1.047E-03 | 4.893E-08 | 5.234E-04 |
| Barium | 4.346E-03 | 3.255E-05 | 5.342E-05 | 1.526E-05 | 2.423E-02 | 1.133E-06 | 1.212E-02 |
| Beryllium | 8.024E-05 | 1.649E-06 | QN | GN | QN | QN | QN |
| Cadmium | 8.024E-05 | 1.649E-06 | QN | QN | QN | QN | 2 |
| Chromium | 4.012E-04 | 7.167E-06 | 4.879E-06 | 1,394E-06 | 2.213E-03 | 1.034E-07 | 1.107E-03 |
| Cobalt | 6.352E-05 | 3.763E-06 | 7.400E-07 | 2.114E-07 | 3.357E-04 | 1.569E-08 | 1.678E-04 |
| Copper | 2.129E-01 | 1.159E-03 | 2.622E-03 | 7.490E-04 | 1.189E+00 | 5.558E-05 | 5.946E-01 |
| Lead | 1.527E-02 | 6.770E-05 | 1.882E-04 | 5.378E-05 | 8.538E-02 | 3.991E-06 | 4.269E-02 |
| Manganese | 1.337E-03 | 3.086E-05 | 1.618E-05 | . 4.622E-06 | 7.338E-03 | 3.430E-07 | 3.669E-03 |
| Nickel | 6.241E-04 | 1.433E-05 | 7.551E-06 | 2.157E-06 | 3.425E-03 | 1.601E-07 | 1.712E-03 |
| Selenium | 2.675E-04 | 5.497E-06 | Q | QN | QN | 9 | QN |
| Silver | 5.349E-05 | 1.099E-06 | QN | QN | QN | QN | QN |
| Thallium | 8.024E-05 | 1.613E-06 | QN | QN | QN | S | QN |
| Zinc | 4.012E-02 | 1,445E-04 | 4.950E-04 | 1.414E-04 | 2.245E-01 | 1.049E-05 | 1.123E-01 |
| Footnotes: 'ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) | for additional info | ormation on the | data, refer to the | Firing Point Emiss | ions Study) | | |
| ND = Not Detected | | | |) | | | |
| | | | | | | | |

M3series_air_print.xls

Table B-42: Air Modeling Output Data for Volatile Organic Compounds - 100 meter location

| | | | C88 (C - T - / F V C81 | 2000000 | (1) openios jo old | * | apanos |
|---------------------------------------|----------------------------------|--|--|-------------------------------------|--------------------------|--|---|
| | | | ing charge modi (zone s), mzez cannon DODIC: D540 | | release duration (t): | 2 | seconds |
| | | 200 | | | (A) | 1 1 | |
| | Ž | Net Explosive Weight (NEW) in lbs. Number of items = 1 | /e Welght (NEW) in lbs. => Number of items ≈ 1 | 3.50 | Unit Concentration (UC): | 9.348E-05 | 9.348E-05 (g/m³)/(g/s) |
| | | SF6 Leak Rate D | Leak Rate Dilution Factor => | 0.932 | | | |
| | GARLET LAND | | KATOO STORY | A Marie Control | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background Concentration | Average Adjusted Emission Factor (lb/item) | Average Adjusted Emission Factor | Emitted (grams/ltem) | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) |
| | (III) | (mg/m³) | H | | M | CONC | ER, |
| VOCs | | | | | | | · |
| Dichlorodifluoromethane | 3.762E-03 | 3.762E-03 | GN | QN | QN | ND | ΩN |
| Methyl Chloride | 1.594E-03 | 1.594E-03 | QN | QN | QN | ND | ON |
| Dichlorotetrafluoroethane | 4.683E-03 | 4.683E-03 | QN | QN | QN | ON | QN |
| Vinyi Chloride | 5.069E-03 | 5.069E-03 | QN | QN | ON | ON | QN |
| 1,3-Butadiene | 1.790E-03 | 1.790E-03 | QN | QN | QN | QN | 2 |
| Methyl Bromide | 3.073E-03 | 3.073E-03 | QN | QN | ND | ON . | QN |
| Ethyl Chloride | 2.112E-03 | 2.112E-03 | QN | QN | QN | QN | Q |
| Trichlorofluoromethane | 3.934E-03 | 3.934E-03 | QN | QN | ND | ND | 2 |
| 1,1-Dichloroethene | 9.135E-03 | 6.696E-03 | 3.021E-05 | 8.632E-06 | 1.370E-02 | 1.656E-07 | 3.426E-03 |
| Dichloromethane | 1.697E-01 | 5.722E-03 | 2.031E-03 | 5.803E-04 | 9.213E-01 | 1.113E-05 | 2.303E-01 |
| 3-Chloropropene | 2.754E-03 | 2.754E-03 | QN | QN | ND | ON | S |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 4.767E-03 | 5.750E-03 | QN | QN | ND | ON | ON |
| 1,1-Dichloroethane | 3.159E-03 | 3.159E-03 | QN | QN | QN | ON | QN |
| cls-1,2-Dichloroethene | 3.295E-03 | 3.295E-03 | ΩN | QN | Q | QN | 2 |
| Trichloromethane | 4.099E-03 | 4.099E-03 | QN | QN | ND | ON | NO |
| 1,2-Dichloroethane | 3.443E-03 | 3.443E-03 | QN | ΩN | QN | ND. | Q |
| 1,1,1-Trichloroethane | 1.257E-01 | 1.095E-01 | 2.011E-04 | 5.745E-05 | 9.121E-02 | 1.102E-06 | 2.280E-02 |
| Benzene | 5.461E-02 | 2.329E-03 | 6.763E-04 | 1.932E-04 | 3.068E-01 | 3.706E-06 | 7.669E-02 |
| Carbon Tetrachloride | 4.529E-03 | 4.529E-03 | QN | QN | ND | QN | QN |
| 1,2-Dichloropropane | 3.419E-03 | 3.419E-03 | QN | QN | ND | ΩN | ON |
| Trichloroethene | 3.866E-03 | 3.866E-03 | QN | QN | QN | GN | QN |
| cis-1,3-Dichloropropene | 3.360E-03 | 3.360E-03 | QN | QN | ΩN | QN | ON |
| trans-1,3-Dichloropropene | 2.860E-03 | 2.860E-03 | QN | QN | ND | QN | QN |
| 1,1,2-Trichloroethane | 3.877E-03 | 3.877E-03 | QN | QN | ND | QN | QN |
| Toluene | 7.167E-03 | 3.610E-03 | 4.404E-05 | 1.258E-05 | 1,998E-02 | 2,414E-07 | 4.994E-03 |
| 1,2-Dibromoethane | 5.844E-03 | 5.844E-03 | 2 | Q | QN | QN | Q |
| Tetrachloroethene | 4.475E-03 | 4.475E-03 | QN | Q | QN | QN | QN |
| | | | | | | | |

Table B-42: Air Modeling Output Data for Volatile Organic Compounds - 100 meter location

| | 155mm prope | opelling charge DODI | elling charge M3A1 (zone 3), M284 cannon DODIC: D540 | 84 cannon | No. of rounds (!) release duration (t): | 1 | 1 rounds 2 seconds |
|---------------------------|-----------------|--|---|-------------------------------------|---|--|---|
| | Ne | Net Explosive Weight (NEW) in Ibs. Number of Items = 1 SF6 Leak Rate Ollution Factor | ve Weight (NEW) in Ibs. => Number of Items = 1 ak Rate Dilution Factor => | 3.50 0.932 | Unit Concentration (UC): | 9.348E-05 (g/m³)/(g/s) | (g/b)/(g/w/b) |
| | | White Side | KIN THE RUINGERING | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual | Measured Background | Average Adjusted Emission Factor | Average Adjusted Emission Factor | Emitted (grams/item) | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) |
| | (mg/m³) | Concentration (mg/m³) | (lb/ltem) EF | (Ib/Ib NEW) | Σ | CONC | ER, |
| Chlorobenzene | 2.305E-04 | 2.305E-04 | ΩN | QN | ΩN | QN | ND |
| Ethylbenzene | 2.344E-03 | 2.344E-03 | QN | QN | QN | QN | QN |
| m&p-Xylene | 2,257E-03 | 2.257E-03 | QN | DN | QN | QN | QN |
| Styrene | 2.641E-03 | 2.641E-03 | QN | QN | QN | QN | QN |
| 1,1,2,2-Tetrachloroethane | 4,466E-03 | 4.466E-03 | QN | QN | QN | ON | QN |
| o-Xylene | 2.474E-03 | 2.474E-03 | QN | QN | ND | ND | 2 |
| 4-Ethyltoluene | 2.214E-03 | 2.214E-03 | QN | ON | ON | ON | S |
| 1,3,5-Trimethylbenzene | 2.460E-03 | 2.460E-03 | Q | SD | ON | ΩN | QN |
| 1,2,4-Trimethylbenzene | 2.312E-03 | 2.312E-03 | 2 | Q | ON | ND | QN |
| Benzyl Chloride | 5.076E-03 | 5.076E-03 | Q | Q | ND | ON | QN |
| m-Dichlorobenzene | 3,366E-03 | 3.366E-03 | Q | QN | ON | QN | <u>Q</u> |
| p-Dichlorobenzene | 2.945E-03 | 2.945E-03 | QN | QN | QN | QN | QN |
| o-Dichlorobenzene | 3.606E-03 | 3.606E-03 | QN | QN | QN | QN | QN |
| 1,2,4-Trichlorobenzene | 4.526E-03 | 4.526E-03 | Q | Q | ON | ON | QN |
| Hexachiorobutadiene | 4.690E-03 | 4.690E-03 | QN | QN | ND | ND | QN |
| Methane | 2.130E+00 | 1,364E+00 | 9.490E-03 | 2.712E-03 | 4.305E+00 | 5.201E-05 | 1.076E+00 |
| Ethane | 6.764E-01 | 6.764E-01 | Q | Q | ON | ND | QN |
| Ethylene | 6.310E-01 | 6.310E-01 | S | S | QN | QN | QN |
| Propane | 9.920E-01 | 9.920E-01 | S | Q | QN | QN | 2 |
| Acetylene | 5.858E-01 | 5.858E-01 | ON | QN | QN | QN | S |
| Isobutane | 1.307E+00 | 1.307E+00 | 2 | 2 | ND | QN | QN |
| n-Butane | 1,307E+00 | 1.307E+00 | QN | QN | GN | QN | P |
| Propylene | 9.466E-01 | 9.466E-01 | QN | ON | ND | ON | QN |
| Footnotes: | | | | | | | |

¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

Table B-43: Air Modeling Output Data for Semi-Volatile Organic Compounds - 100 meter location

| | 155mm propel | | ing charge M3A1 (zone 3), M284 cannon | 84 cannon | No. of rounds (I) | 1 | rounds |
|-----------------------------|----------------------------------|---|--|-------------------------------------|--------------------------|-------------------------|------------------------|
| | | | DODIC: D540 | | release duration (t): | 2 | seconds |
| | Ν | Net Explosive Weigh | osive Weight (NEW) in lbs. => | 3.50 | Unit Concentration (UC): | 9.348E-05 | 9.348E-05 (g/m³)/(g/s) |
| | | | | | | | |
| | | _ | Leak Rate Dilution Factor => | 0.932 | | | |
| | | | ्राम्य १५५ मान्य १५५ | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background Concentration | Average Adjusted Emission Factor (fb/item) | Average Adjusted Emission Factor | (grams/Item) | One Round (grams/m³) | One Round (g/sec) |
| | (mg/m ₃) | (mg/m³) | EF | (Ib/Ib NEW) | M | CONC | ER, |
| SVOCs | | | | | | | |
| n-nitrosodimethylamine | 2.402E-03 | 2.446E-03 | ۵N | QN | ND | ND | ND |
| bis(2-chloroethyl)ether | 2.402E-03 | | QN | QN | ND | ND | QN |
| phenol | 2.642E-02 | 1.712E-02 | 1.151E-04 | 3.289E-05 | 5.221E-02 | 6.309E-07 | 1.305E-02 |
| 2-chlorophenol | 2.402E-03 | 2.446E-03 | QN | QN | ND | ON | QN |
| 1,3-dichlorobenzene | 2.402E-03 | 2.446E-03 | QN | Q | ND | ON | ON |
| 1,4-dichlorobenzene | 2.402E-03 | 2.446E-03 | QN | Q | QN | QN. | Q |
| 1,2-dichlorobenzene | 2.402E-03 | 2.446E-03 | Q. | S | ND | ND | QN |
| benzyl alcohol | 2.402E-03 | 2.446E-03 | ON | QN | ND | ND | QN |
| bis(2-chlorolsopropyl)ether | 2.402E-03 | 2,446E-03 | ۵N | QN | ND | ND | ND |
| 2-methylphenol | 2,402E-03 | 2.446E-03 | QN | QN | QN | ND | ON |
| hexachloroethane | 2.402E-03 | 2.446E-03 | QN | QN | ND | ND | ND |
| n-nitroso-di-n-propylamine | 2.402E-03 | 2,446E-03 | QN | QN | . QN | QN | QN |
| 4-methylphenol | 2.402E-03 | 2.446E-03 | QN | QN | ND | QN | QN |
| nitrobenzene | 2.402E-03 | 2.446E-03 | 2 | Q | QN | QN | QN |
| isophorone | 2,402E-03 | 2.446E-03 | QN | ND | QN | ND | QN |
| 2-nitrophenol | 2.402E-03 | 2.446E-03 | ON | QN | QN | ON | ND |
| 2,4-dimethylphenol | 2.402E-03 | 2.446E-03 | Q | 2 | ND | ND | QN |
| bis(2-chloroethoxy)methane | 2.402E-03 | 2.446E-03 | 2 | Q | QN | ON. | Q |
| 2,4-dichlorophenol | 2.402E-03 | 2,446E-03 | Q | Q | QN | QN | Q |
| 1,2,4-trichlorobenzene | 2.402E-03 | 2.446E-03 | QN | Q | ND | ND | ON |
| naphthalene | 3.145E-03 | 2.446E-03 | 3.894E-05 | 1.113E-05 | 1.766E-02 | 2.134E-07 | 4,416E-03 |
| 4-chloroaniline | 2.402E-02 | 2.446E-02 | ON | Q | QN | QN | QN |
| hexachlorobutadiene | 2.402E-03 | 2.446E-03 | QN | Q | QN | . ON | QN |
| 4-chloro-3-methylphenol | 2.402E-03 | 2.446E-03 | ΩN | 2 | QN | ON | S |
| 2-methylnaphthalene | 2.402E-03 | 2.446E-03 | 2 | 2 | QN | <u>N</u> | Q |
| hexachlorocyclopentadiene | 2.402Ё-03 | 2.446E-03 | 2 | 9 | ΩN | 2 | 2 |
| 2,4,6-trichlorophenol | 2.402E-03 | 2.446E-03 | QV | Q | Ω | QN | Q |

Table B-43: Air Modeling Output Data for Semi-Volatile Organic Compounds - 100 meter location

| | 155mm prope | ropeliing charge DODI | elling charge M3A1 (zone 3), M284 cannon DODIC: D540 | 84 cannon | No. of rounds (I) release duration (t): | 7 | rounds seconds |
|---|---|--|--|--|---|--|--|
| | Ν | Net Explosive Weigh Number o SF6 Leak Rate D | plosive Weight (NEW) in lbs. => Number of Items = 1 6 Leak Rate Dilution Factor => | 3.50 0.932 | Unit Concentration (UC): | 9.348E-05 | 9.348E-05 (g/m³)/(g/s) |
| | | W. Relablecy Click | | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (lb/ltem) EF | Average Adjusted Emission Factor (lb/lb NEW) | Emitted (grams/ltem) M | Concentration for One Round (grams/m³) CONC | Emission Rate for One Round (g/sec) ER ₁ |
| 2,4,5-trichlorophenol | 2.402E-03 | 2.446E-03 | QN | QN | QN | ND | QN |
| 2-chloronaphthalene | 2.402E-03 | 2.446E-03 | QN | QN | QN | QN. | QN |
| 2-nitroaniline | 2.402E-03 | 2.446E-03 | QN | QN | ND | ON | QN |
| dimethylphthalate | 2.402E-03 | 2,446E-03 | QN | QN | GN | QN | QV. |
| 2,6-dinitrotoluene | 2.402E-03 | 2,446E-03 | ON | QN | QN | QN | QN |
| 3-nitroaniline | 4.803E-03 | 4.892E-03 | QN | QN | QN | QN | QN |
| 2,4-dinitrophenol | 4.803E-03 | 4.892E-03 | QN. | QN | QN | ON | QN |
| dibenzofuran | 2.402E-03 | 2.446E-03 | QN | QN | QN | QN | QV |
| 2,4-dinitrotoluene | 2.402E-03 | 2.446E-03 | QN | ΩN | QN | QN | QN |
| 4-nitrophenol | 4.803E-03 | 4.892E-03 | Q | QN | ON | QN | QN |
| 4-chlorophenyl-phenylether | 2.402E-03 | 2.446E-03 | Q | ΩN | QN | QN | QN |
| dlethylphthalate | 2.402E-03 | 2.446E-03 | QN | Q | ND | ON | QN |
| 4-nitroaniline | 4.803E-03 | 4.892E-03 | Q | QN | ND | ON | QN |
| 4,6-dinitro-2-methylphenol | 4.803E-03 | 4.892E-03 | QQ | Q | ND | ON | QN |
| n-nitrosodiphenylamine(1) | 2.402E-03 | 2.446E-03 | QN | Q | QN | ON | QN |
| 4-bromophenyl-phenylether | 2.402E-03 | 2.446E-03 | Q | Q | QN | ON | ND |
| hexachlorobenzene | 2.402E-03 | 2.446E-03 | QN | Q | ND | QN | QN |
| pentachlorophenol | 4.803E-03 | 4.892E-03 | ΩN | Q | QN | QN | ON |
| di-n-butylphthalate | 5.873E-03 | 2.446E-03 | 7.273E-05 | 2.078E-05 | 3.299E-02 | 3.986E-07 | 8.248E-03 |
| butylbenzylphthalate | 2.402E-03 | 2.446E-03 | QN | Q | ND | QN | QN |
| bis(2-ethylhexyl)phthalate | 7.191E-02 | 1.027E-01 | Q | 2 | ND | ON | ND |
| dl-n-octylphthalate | 2.402E-03 | 2.446E-03 | QN | ND | ND | QN | ND |
| 7.0000000000000000000000000000000000000 | | | | | | | |

Footnotes:
\[ATC = Aberdeen Test Center (for additional Information on the data, refer to the Firing Point Emissions Study) \]
\[ND = Not Detected \]

1/16/01

Table B-44: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases 100 meter location

| | | - | 010 (0 | 100000 | (1) chance to old | 7 | o position |
|------------------------|--------------------------|------------------------|---|------------------|--------------------------|-----------------|--------------------------------|
| - | ledord mmccr | _ | ing cnarge insAt (zone s), inz64 cannon | of cannon | No. of founds (1) | _ | louids |
| | | DOD | DODIC: D540 | | release duration (t): | 8 | 2 seconds |
| | Nev | Net Explosive Weigh | osive Weight (NEW) in lbs. => | 3.50 | Unit Concentration (UC): | 9.348E-05 | 9.348E-05 (g/m³)/(g/s) |
| | | Number of Bate I | Number of Items = 1 | 0.032 | | | |
| | | SFO Leak Ivale L | 3 | 2000 | | | |
| | | STANKSTERING. | | | Total Mass of Substance | Average Modeled | Substance Emission Rate for |
| Compound | Measured Actual | Measured Background | Average Adjusted Emission Factor | Average Adjusted | (grams/Item) | One Round | One Round (a/sec) |
| | Concentration (mg/m³) | Concentration (mg/m³) | (lb/ltem) EF | (Ib/Ib NEW) | Σ | CONC | ER, |
| PAHs (TO-13 Method) | | | | | | | |
| acenaphthylene | 5.329E-04 | 1.027E-05 | 6.472E-06 | 1.849E-06 | 2.936E-03 | 3.547E-08 | 7.339E-04 |
| acenaphthene | 1.682E-04 | 3.180E-04 | QN | QN | QN | QN | QN |
| fluorene | 2.490E-04 | 2.275E-04 | 2.658E-07 | 7.595E-08 | 1.206E-04 | 1.457E-09 | 3.015E-05 |
| phenanthrene | 3,516E-04 | 1.932E-04 | 1.961E-06 | 5.604E-07 | 8.897E-04 | 1.075E-08 | 2.224E-04 |
| anthracene | 5.198E-05 | 7.094E-06 | 5.558E-07 | 1.588E-07 | 2.521E-04 | 3.046E-09 | 6.303E-05 |
| fluoranthene | 1.712E-04 | 1.614E-05 | 1.920E-06 | 5.486E-07 | 8.709E-04 | 1.052E-08 | 2.177E-04 |
| pyrene | 3.254E-04 | 1.663E-05 | 3.823E-06 | 1.092E-06 | 1.734E-03 | 2.095E-08 | 4.335E-04 |
| benzo(a)anthracene | 2.751E-05 | 2.446E-06 | 3,406E-07 | 9.732E-08 | 1.545E-04 | 1.867E-09 | 3.863E-05 |
| chrysene | 2.751E-05 | 2.446E-06 | 3.406E-07 | 9.732E-08 | 1.545E-04 | 1.867E-09 | 3.863E-05 |
| benzo(b)fluoranthene | 7.178E-05 | 2.446E-06 | 8.889E-07 | 2.540E-07 | 4.032E-04 | 4.872E-09 | 1.008E-04 |
| benzo(k)fluoranthene | 4.740E-05 | 2.446E-06 | 5.870E-07 | 1.677E-07 | 2.662E-04 | 3.217E-09 | 6.656E-05 |
| benzo(a)pyrene | 1.089E-04 | 2.446E-06 | 1.349E-06 | 3.854E-07 | 6.119E-04 | 7.393E-09 | 1.530E-04 |
| indeno(1,2,3-cd)pyrene | 1.530E-04 | | 1.858E-06 | 5.309E-07 | 8.428E-04 | 1.018E-08 | 2.107E-04 |
| dibenz(a,h)anthracene | 5.148E-06 | | 6.375E-08 | 1.821E-08 | 2.892E-05 | 3.494E-10 | 7.229E-06 |
| benzo(g,h,i)perylene | 2.715E-04 | 5.626E-06 | 3.292E-06 | 9.406E-07 | 1.493E-03 | 1.804E-08 | 3.733E-04 |
| Dioxin/Furan Data | | | | | | | |
| 2378-TCDD | 4.245E-10 | 8.000E-12 | Q. | | QN | ON! | Q. |
| 12378-PECDD | 3.225E-10 | 9.000E-12 | Q I | 2 | ON C | ON S | QN : |
| 123478-HXCDD | 5.490E-10 | 1.050E-11 | ON COLOR | ON 150 | ON CALL | ON CALL | ON COLOR |
| 123678-HXCDD | 7.580E-10 | 1./00E-11 | 9.31ZE-1Z | Z.001E-1Z | 4.ZZ4E-09 | 5.104E-14 | 1,056E-09 |
| 123789-HXCDD | 8.705E-10 | 1.550E-11 | 1.059E-11 | 3.025E-12 | 4.802E-09 | 5.803E-14 | 1.201E-09 |
| 1234678-HPCDD | 9.178E-09 | 2.495E-10 | 1.106E-10 | 3.159E-11 | 5.015E-08 | 6.059E-13 | 1.254E-08 |
| ocdd | 4.458E-08 | 1.587E-09 | 5.324E-10 | 1.521E-10 | 2.415E-07 | 2.918E-12 | 6.037E-08 |
| 2378-TCDF | 1,230E-10 | 1.100E-11 | QN | Q | QN | QN | QN |
| 12378-PECDF | 3.375E-10 | 1.050E-11 | QN | ΩN | QN | ΩN | QN |
| 23478-PECDF | 1:950E-10 | 1.550E-11 | Q | Q | QN | 2 | ON |
| 123478-HXCDF | 1.840É-10 | 2.800E-11 | Q | Q | ON | QN | Q |
| 123678-HXCDF | 1.795E-10 | 1.450E-11 | Q. | Q. | QN | Q | ND |
| 123789-HXCDF | 3.220E-10 | 6.000E-12 | Q | 2 | QN | QN | SP |

1/16/01

Table B-44: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dloxins/Furans, Aldehydes, and Acid Gases 100 meter location

| | 155mm p | ropelling charge | 155mm propelling charge M3A1 (zone 3), M284 cannon | 84 cannon | No. of rounds (I) | _ | rounds |
|--------------------------|----------------------|--------------------------|--|--|--------------------------|--|---|
| | | Idoa | DODIC: D540 | | release duration (t): | 2 | seconds |
| | eN. | Net Explosive Weigh | plosive Weight (NEW) in lbs. => | 3.50 | Unit Concentration (UC): | 9.348E-05 | 9.348E-05 (g/m³)/(g/s) |
| | | Number of | Number of Items = 1 | | | | |
| | | SF6 Leak Rate D | Leak Rate Dilution Factor ≈> | 0.932 | | | |
| | | Justice Silvery | Rule and in the Activities | The second secon | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual | Measured Background | Average Adjusted Emission Factor | Average Adjusted | Emitted (grams/item) | Concentration for One Round (grams/m³) | Emission Rate for One Round (q/sec) |
| | (mg/m ₃) | Concentration (mg/m³) | (lb/ltem) EF | (lb/lb NEW) | Σ | CONC | ER, |
| 234678-HXCDF | 2.640E-10 | 1.200E-11 | QN | · QN | QN | QN | QN. |
| 1234678-HPCDF | 7.080E-10 | 7.750E-11 | 7.808E-12 | 2.231E-12 | 3.541E-09 | 4.279E-14 | 8.854E-10 |
| 1234789-HPCDF | 3.755E-10 | 8.000E-12 | ON | QN | QN | Q | 9 |
| OCDF | 1.436E-09 | 1.105E-10 | 1.641E-11 | 4.690E-12 | 7.445E-09 | 8.996E-14 | 1,861E-09 |
| Aldehydes | | | | | | | |
| Formaldehyde | 1.228E-02 | 1.228E-02 | QN | QN | QN | QN | Q |
| Acetaldehyde | 1.802E-02 | 1.802E-02 | Q | QN | QN | QN | 2 |
| Acetone | 3.563E-02 | 4.751E-02 | Ω | QN | ND | QN | QN |
| Acrolein | 2.294E-02 | 2,294E-02 | Q | QN | QN | QN | 2 |
| Proprionaldehyde | 2.374E-02 | 2.374E-02 | QN | QN | DN | QN | 9 |
| Crotonaldehyde | 2.867E-02 | 2.867E-02 | ON | QN | QN | 2 | 2 |
| Butyraldehyde | 2.949E-02 | 2.949E-02 | ON | QN | QN | <u>Q</u> | Q |
| Benzaldehyde | 4.340E-02 | 4.340E-02 | QN | QΝ | QN | 9 | QN |
| Isovaleraldehyde | 3.523E-02 | 3.523E-02 | QN | QN | ND | QV. | Q |
| Valeraldehyde | 3.523E-02 | 3.523E-02 | Q | QN | ND | QN | QN |
| o,m,p-Tolualdehyde | 9.828E-02 | 9.828E-02 | Q | Q | QN | QN | ON |
| Hexaldehyde | 4.097E-02 | 4.097E-02 | S | ΩΩ | QN | ON | QN |
| 2,5-Dimethylbenzaldehyde | 4.097E-02 | 4.097E-02 | ΩN | QN | QN | ON . | QN |
| Acid gases | | | | | | | |
| Hydrogen fluoride | 1.400E-01 | 1.400E-01 | Q | Q | QN | ON | QN. |
| Hydrogen chloride | 1.300E-01 | 1.300E-01 | S | QN | DN | QN | S |
| Hydrogen bromide | 1.400E-01 | 1.400E-01 | ON | QN | ON | ON. | 9 |
| Nitric Acid | 2.400E-01 | 2.200E-01 | 2.477E-04 | 7.076E-05 | 1.123E-01 | 1.357E-06 | 2.808E-02 |
| Phosphoric acid | 1.400E-01 | 1.400E-01 | Q | Q | ND | QN | QN |
| Sulfuric Acid | 2.950E-01 | 1.400E-01 | 3.653E-03 | 1.044E-03 | 1.657E+00 | 2.002E-05 | 4.142E-01 |
| Tooland. | | | | | | | |

ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study)
ND = Not Detected

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Table B-45: Air Modeling Output Data for Cyanide and Energetics - 100 meter location

| | 155mm pr | opeliing charge | 155mm propelling charge M3A1 (zone 3), M284 cannon กุกการ กรุงก | 84 cannon | No. of rounds (I) | 1 | 1 rounds |
|-----------------------------|--|------------------------|--|--|---------------------------|--|---|
| | TOTAL | | 1 | 2 60 | This Concentration (10): | 30 H046 O | secolius (-1-3/4-1-) |
| | JAN THE PROPERTY OF THE PROPER | Net Explosive weight | iosive vveignt (INEVV) itt ios. => | 9:30 | Offit Concentration (OC): | 9.348E-03 | 9.346E-U3 (g/m²)/(g/s) |
| | | SF6 Leak Rate D | Leak Rate Dilution Factor => | 0.932 | | | |
| | | | | E CONTROL OF THE STATE OF THE S | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background | Average Adjusted Emission Factor | Average Adjusted Emission Factor | Emitted (grams/item) | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) |
| | (mg/m³) | (mg/m³) | EF (EF | (Ib/Ib NEW) | Σ | CONC | ER, |
| Particulate Cyanide and HCN | | | | - | | | |
| Particulate Cyanide | 8.000E-02 | 8.000E-02 | QN | QN | QN | 2 | Q |
| Hydrogen Cyanide | 9.000E-01 | | 1.114E-02 | 3.184E-03 | 5.055E+00 | 6.108E-05 | 1.264E+00 |
| Energetics Data | | | | | | | |
| Nitrobenzene | 4.713E-01 | 2.031E-01 | QN | QN | QN | QN | QN |
| 2-Nitrotoluene | 4.713E-01 | 2.031E-01 | QN | QN | QN | QN | QN |
| 3-Nitrotoluene | 4.713E-01 | 2.031E-01 | QN | QN | ON | ON | 2 |
| 4-Nitrotoluene | 4.713E-01 | 2.031E-01 | QΝ | QN | QN | ND | QN |
| Nitroglycerine | 4.713E-01 | 2.031E-01 | ND | ND | ND | ON | QN N |
| 1,3-Dinitrobenzene | 4.713E-01 | 2.031E-01 | QN | QN | DN | QN | QN |
| 2,6-DinItrotoluene | 4.713E-01 | 2.031E-01 | ON | QN | QN | QN | QN |
| 2,4-Dinitrotoluene | 4.713E-01 | 2.031E-01 | QN | QN | QN | ON | QN. |
| 1,3,5-Trinitrobenzene | 4.713E-01 | 2.031E-01 | ۵N | QΝ | QN | ON | ON |
| 2,4,6-Trinitrotoluene | 4.713E-01 | 2.031E-01 | QN | QN | QN | ON | QN |
| RDX | 4.713E-01 | 2.031E-01 | QN | ON | ON | QN | QN |
| 4-Amino-2,6-Dinitrotoluene | 4.713E-01 | 2.031E-01 | QN | QN | QN | QN | 2 |
| 2-Amino-4,6-Dinitrotoluene | 4.713E-01 | 2.031E-01 | ON | QN | ON | QN | QN |
| Tetryl | 4.713E-01 | 2.031E-01 | QN | QN | QN | ON | QN |
| НМХ | 9.426E-01 | 4.062E-01 | QN | ON | QN | ON | QN |
| Pentaerythritoltetranitrate | 9.426E-01 | 4.062E-01 | QN | ON | ND | QN | QN |
| Dibutyl phthalate | 2.357E+01 | 1,016E+01 | QN | QN. | ND | ON | QN |
| Dioctyl phthalate | 2.357E+01 | 1.016E+01 | Q | Q | ND | QN | QN |
| Diphenylamine | 1.178E+01 | 5.078E+00 | 2 | Q | ND | QN | ON |

Footnotes:

¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

AIR MODELING OUTPUT DATA FOR CHARGE M3A1, FIRED FROM THE M284 CANNON, ZONE 3, 200 METERS DOWNWIND

Table B-46: Air Modeling Output Data for Gases, Metals, and Particulates - 200 meter location

| | 155mm pi | ropelling charge DODIA | 155mm propelling charge M3A1 (zone 3), M284 cannon DODIC: D540 | 84 cannon | No. of rounds (I) release duration (t): | 1 | rounds seconds |
|--|---|--|---|---|---|--|--|
| | SN. | Net Explosive Weight (NEW) in Ibs. | t (NEW) in lbs. => | 3.50 | Unit Concentration (UC): | 4.833E-05 | 4.833E-05 (g/m³)/(g/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 ak Rate Dilution Factor => | 0.932 | | | |
| | | | ARCHING LEGIKO IIII. MAY | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (lb/item) EF | Average Adjusted Emission Factor (ib/ib NEW) | Emitted (grams/Item) M | Concentration for One Round (grams/m³) | Emission Kade for One Round (g/sec) ER, |
| Gases | | | | | | | |
| ZT3 | 5.530E+00 | AN | 6.382E-02 | 1.824E-02 | 2.895E+01 | 3.498E-04 | 7,237E+00 |
| 202 | 6.120E+01 | ΑN | 7.063E-01 | 2.018E-01 | 3.204E+02 | 3.871E-03 | 8.010E+01 |
| 00 | 1.656E+02 | AN | 1.911E+00 | 5.461E-01 | 8.669E+02 | 1.047E-02 | 2.167E+02 |
| NOx (as NO) | 2.952E+00 | NA | 3.407E-02 | 9.734E-03 | 1.545E+01 | 1.867E-04 | 3,863E+00 |
| CH4 | 2.178E+00 | ΨN | ΩN | QN | QN | ON | ON |
| 802 | 5.240E-01 | Ā | QN | QN | ND | QN | ND |
| Combined Particulate | | | | | | | |
| TSP | 5.510E+00 | 5.300E-02 | 6.758E-02 | 1.931E-02 | 3.065E+01 | 3.703E-04 | 7,663E+00 |
| PM10 | 4.875E+00 | 4.233E-02 | 5.984E-02 | 1.710E-02 | 2.714E+01 | 3,279E-04 | 6.785E+00 |
| PM2.5 | 2.731E+00 | 2.400E-02 | 3.352E-02 | 9.578E-03 | 1.520E+01 | 1.837E-04 | 3.801E+00 |
| Metals | | | | | | | |
| Antimony | 1.872E-04 | 4.345E-06 | ND | ON | NΩ | Q | QN |
| Arsenic | 1.895E-04 | 3.091E-06 | 2.308E-06 | 6.594E-07 | 1.047E-03 | 1.265E-08 | 2.617E-04 |
| Barlum | 4,346E-03 | 3.255E-05 | 5.342E-05 | 1.526E-05 | 2.423E-02 | 2.928E-07 | 6.058E-03 |
| Beryllium | 8.024E-05 | 1.649E-06 | QN | ΩN | ND | QN | QN ON |
| Cadmium | 8.024E-05 | 1.649E-06 | QN | QN | ND | QN | S |
| Chromium | 4.012E-04 | 7.167E-06 | 4.879E-06 | 1.394E-06 | 2.213E-03 | 2.674E-08 | 5.533E-04 |
| Cobalt | 6.352E-05 | 3.763E-06 | 7.400E-07 | 2.114E-07 | 3.357E-04 | 4.056E-09 | 8.392E-05 |
| Copper | 2.129E-01 | 1.159E-03 | 2.622E-03 | 7.490E-04 | 1.189E+00 | 1,437E-05 | 2.973E-01 |
| Lead | 1.527E-02 | 6.770E-05 | 1.882E-04 | 5.378E-05 | 8.538E-02 | 1.032E-06 | 2.134E-02 |
| Manganese | 1.337E-03 | 3.086E-05 | 1.618E-05 | 4.622E-06 | 7.338E-03 | 8.867E-08 | 1.835E-03 |
| Nickel | 6.241E-04 | 1.433E-05 | 7.551E-06 | 2.157E-06 | 3.425E-03 | 4.138E-08 | 8.562E-04 |
| Selenium | 2.675E-04 | 5.497E-06 | QN | ND | QN | <u>Q</u> | ΩN |
| Silver | 5,349E-05 | 1.099E-06 | QN | NO | ND | Q | ND |
| Thallium | 8.024E-05 | 1.613E-06 | ON | ON | ND | 2 | SD |
| Zinc | 4.012E-02 | 1.445E-04 | 4,950E-04 | 1.414E-04 | 2.245E-01 | 2.713E-06 | 5.613E-02 |
| Footnotes: | | | | | | | |
| ¹ ATC = Aberdeen Test Center (for additional inform | (for additional in | formation on the | data, refer to the | ation on the data, refer to the Firing Point Emissions Study) | slons Study) | | |
| ND = Not Detected | | | | | | | |
| | | | | | | | |

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Table B-47: Air Modeling Output Data for Volatile Organic Compounds - 200 meter location

| | 155mm propel | ropelling charge | Iling charge M3A1 (zone 3), M284 cannon | 84 cannon | No. of rounds (f) | - | spunos |
|---------------------------------------|----------------------------------|---|--|-------------------------------------|--------------------------|-------------------------|------------------------|
| | | DOD | DODIC: D540 | | release duration (t): | 4 | seconds |
| | eV. | Net Explosive Weight | osive Weight (NEW) in lbs. => | 3.50 | Unit Concentration (UC): | 4.833E-05 | 4.833E-05 (g/m³)/(g/s) |
| | | Number o | Number of Items = 1 Leak Rate Dilution Factor => | 0.932 | | - | |
| | | TATATA | | | Total Mass of Substance | Average Modeled | Substance |
| | | | The state of the s | Colone Standard Control and Sugar B | Emitted | Concentration for | Emission Rate for |
| Compound | Measured Actual Concentration | Measured Background Concentration | Average Adjusted Emission Factor (lb/ltem) | Average Adjusted Emission Factor | (grams/ltem) | One Round (grams/m³) | One Round (g/sec) |
| | (mg/m ₃) | (mg/m ₃) | EF | (lb/lb NEW) | M | CONC | ER, |
| VOCs | | | | | | | |
| Dichlorodifluoromethane | 3.762E-03 | 3.762E-03 | QN | QN | QN | QN | QN |
| Methyl Chloride | 1.594E-03 | 1.594E-03 | QN | QN | QN | QN | QN |
| Dichlorotetrafluoroethane | 4.683E-03 | 4.683E-03 | ΩN | QN | QN | QN | QN |
| Vinyl Chloride | 5.069E-03 | 5.069E-03 | QN | QN | QN | ΩN | QN |
| 1,3-Butadlene | 1.790E-03 | 1.790E-03 | QN | Q | ND | GN | QN |
| Methyl Bromide | 3.073E-03 | 3.073E-03 | ON | QN | QN | QN | QN |
| Ethyl Chloride | 2.112E-03 | 2.112E-03 | QN | 9 | QN | DN | ON |
| Trichlorofluoromethane | 3.934E-03 | 3.934E-03 | ON. | S | ND | ND | ΩN |
| 1,1-Dichloroethene | 9.135E-03 | 6.696E-03 | 3.021E-05 | 8.632E-06 | 1.370E-02 | 1.656E-07 | 3.426E-03 |
| Dichloromethane | 1.697E-01 | 5.722E-03 | 2.031E-03 | 5.803E-04 | 9.213E-01 | 1.113E-05 | 2.303E-01 |
| 3-Chloropropene | 2.754E-03 | | 9 | 2 | QV | . QN | QN |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 4.767E-03 | 5.750E-03 | QN | QN | QN | ND | ΩN |
| 1,1-Dichloroethane | 3.159E-03 | 3.159E-03 | QN | ON | QN | QN | QN |
| cls-1,2-Dichloroethene | 3.295E-03 | 3.295E-03 | QN | QN | ON | QN | QN |
| Trichloromethane | 4.099E-03 | 4.099E-03 | ON | QN | QN | ND | QN |
| 1,2-Dichloroethane | 3.443E-03 | 3.443E-03 | ON | QN | ON | ND | QN |
| 1,1,1-Trichloroethane | 1.257E-01 | 1.095E-01 | 2.011E-04 | 5.745E-05 | 9.121E-02 | 1.102E-06 | 2.280E-02 |
| Benzene | 5.461E-02 | 2.329E-03 | 6.763E-04 | 1.932E-04 | 3.068E-01 | 3.706E-06 | 7.669E-02 |
| Carbon Tetrachloride | 4.529E-03 | | Q. | 2 | QN | SO | QN |
| 1,2-Dichloropropane | 3.419E-03 | 3.419E-03 | ON | Q | QN | ON | QN |
| Trichloroethene | 3.866E-03 | | ON | QN | QN | ON | QN |
| cls-1,3-Dichloropropene | 3.360E-03 | 3.360E-03 | QN | QN | ND | QN | QN |
| trans-1,3-Dichloropropene | 2.860E-03 | | QN | ON | QN | ND | QN |
| 1,1,2-Trichloroethane | 3.877E-03 | 3.877E-03 | ON | QN | QN | ND | QN |
| Toluene | 7,167E-03 | 3.610E-03 | 4.404E-05 | 1.258E-05 | 1.998E-02 | 2.414E-07 | 4.994E-03 |
| 1,2-Dibromoethane | 5.844E-03 | 5.844E-03 | QN | Q | QN | QN | QΝ |
| Tetrachioroethene | 4.475E-03 | 4.475E-03 | Q | Q. | ND | QN | QQ |
| | | | | | | | |

Table B-47: Air Modeling Output Data for Volatile Organic Compounds - 200 meter location

| | 155mm prope | opelling charge | Iling charge M3A1 (zone 3), M284 cannon | 84 cannon | No. of rounds (I) | 1 | rounds |
|---------------------------|-----------------------|--|---|--------------------------------|--------------------------|--------------------------------|--------------------------------|
| | | DOD | DODIC: D540 | | release duration (t): | 4 | 4 seconds |
| | Net | Net Explosive Weigh | plosive Weight (NEW) in lbs. => | 3.50 | Unit Concentration (UC): | 4.833E-05 | 4.833E-05 (g/m³)/(g/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 sk Rate Dilution Factor => | 0.932 | | | |
| | | | | | Total Mass of Substance | Average Modeled | Substance |
| Callorano | Measured Actual | Measured | Average Adjusted | Average Adjusted | Emitted (grams/item) | Concentration for One Round | Emisslon Rate for One Round |
| | Concentration (mg/m³) | Sackground Concentration (mg/m³) | Emission Factor (lb/ltem) EF | Emission Factor (lb/lb NEW) | Σ | (grams/m³) | (g/sec) FR. |
| | | | | , | | 2000 | |
| Chlorobenzene | 2.305E-04 | 2.305E-04 | QN | QN . | QN | QN | Q |
| Ethylbenzene | 2.344E-03 | 2.344E-03 | QN | QN | QN | QN | 9 |
| m&p-Xylene | 2.257E-03 | 2.257E-03 | QN | QN | QN | GN | QN |
| Styrene | 2.641E-03 | 2.641E-03 | QN | QN | QN | QN | Q |
| 1,1,2,2-Tetrachloroethane | 4.466E-03 | 4.466E-03 | QN | QN | QN | QN | QN |
| o-Xylene | 2.474E-03 | 2.474E-03 | QN | QN | QN | QN | 9 |
| 4-Ethyltoluene | 2.214E-03 | 2.214E-03 | QN | QN | QN | QN | QN |
| 1,3,5-Trimethylbenzene | 2.460E-03 | 2.460E-03 | QN | QN | QN | QN | Q |
| 1,2,4-Trimethylbenzene | 2.312E-03 | 2.312E-03 | QN | QN | ON | QN | Q |
| Benzyi Chloride | 5.076E-03 | 5.076E-03 | QN | ΩN | QN | Q. | QN |
| m-Dichlorobenzene | 3.366E-03 | 3.366E-03 | ND | QN | QN | CIN | ΩN |
| p-Dichlorobenzene | 2.945E-03 | 2.945E-03 | ON | QN | QN | QV | 2 |
| o-Dichlorobenzene | 3.606E-03 | 3.606E-03 | QN | ΩN | QN | S | 9 |
| 1,2,4-Trichlorobenzene | 4.526E-03 | 4.526E-03 | ON | QN | QN | QN | QN. |
| Hexachlorobutadiene | 4.690E-03 | 4.690E-03 | Q | Ð | ON | QN | QN |
| Methane | 2.130E+00 | 1.364E+00 | 9.490E-03 | 2.712E-03 | 4.305E+00 | 5.201E-05 | 1.076E+00 |
| Ethane | 6.764E-01 | 6.764E-01 | QN | QN | ON | QN | Q. |
| Ethylene | 6.310E-01 | 6.310E-01 | QN | Q | ON | N | S |
| Propane | 9.920E-01 | 9.920E-01 | QN | QN | QN | Q | S |
| Acetylene | 5.858E-01 | 5.858E-01 | ND | QN | . QN | QN | ON |
| Isobutane | 1.307E+00 | 1.307E+00 | DN | QN | ON | QN | QN |
| n-Butane | 1.307E+00 | 1.307E+00 | QN | ON O | ON | QN | QN |
| Propylene | 9.466E-01 | 9,466E-01 | ΩN | QN | ND | QN | QN |
| Footnotes: | | | | | | | |

¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

Table B-48: Air Modeling Output Data for Semi-Volatile Organic Compounds - 200 meter location

| | 155mm propel | _ | Ing charge M3A1 (zone 3), M284 cannon | 84 cannon | No. of rounds (I) | | rounds |
|-----------------------------|----------------------------------|---|--|-------------------------------------|--------------------------|----------------------|------------------------|
| | | DOD | DODIC: D540 | | release duration (t): | 4 | seconds |
| | θN | Net Explosive Weigh | osive Weight (NEW) in ibs. => | 3.50 | Unit Concentration (UC): | 4.833E-05 | 4.833E-05 (g/m³)/(g/s) |
| | | Number | Number of items = 1 | | | | |
| | | SF6 Leak Rate D | Leak Rate Dilution Factor => | 0.932 | | | |
| | | | | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background Concentration | Average Adjusted Emission Factor (lb/item) | Average Adjusted Emission Factor | Emitted (grams/Item) | One Round (grams/m³) | One Round (g/sec) |
| | (mg/m ₃) | (mg/m³) | EF | (Ib/Ib NEW) | M | CONC | ER, |
| SVOCs | | | | | | | |
| n-nitrosodimethylamine | 2.402E-03 | 2.446E-03 | QN | QN | ND | GN | ΩN |
| bis(2-chloroethyl)ether | 2,402E-03 | 2.446E-03 | ΩN | QN | QN | an | QN |
| phenol | 2.642E-02 | 1.712E-02 | 1.151E-04 | 3.289E-05 | 5.221E-02 | 6.309E-07 | 1.305E-02 |
| 2-chlorophenol | 2.402E-03 | 2.446E-03 | QN | QN | QN | QN | QN |
| 1,3-dichlorobenzene | 2.402E-03 | 2.446E-03 | ΩN | ND | ND | SD | ND |
| 1,4-dichlorobenzene | 2.402E-03 | 2.446E-03 | QN | Q | ΩN | QV | QN |
| 1,2-dichlorobenzene | 2.402E-03 | 2.446E-03 | QN | QN | ND | QN | ND |
| benzyl alcohol | 2.402E-03 | 2.446E-03 | S | 2 | ND | ΩN | QN |
| bis(2-chloroisopropyl)ether | 2.402E-03 | 2.446E-03 | ON | ND | ND | ON | ΩN |
| 2-methylphenol | 2.402E-03 | 2.446E-03 | QN | Q | ND | ΩN | ON |
| hexachloroethane | 2.402E-03 | 2.446E-03 | QN | QN. | ND | ON | QN |
| n-nitroso-di-n-propylamine | 2.402E-03 | 2.446E-03 | QN | QN | ND | QN | QN |
| 4-methylphenol | 2.402E-03 | 2.446E-03 | ΩN | QN | QN | QN | QN |
| nitrobenzene | 2.402E-03 | 2.446E-03 | QN | QN | QN | GN | QN |
| isophorone | 2.402E-03 | 2.446E-03 | QN | QN | ND | QN | QN |
| 2-nitrophenol | 2.402E-03 | 2.446E-03 | QN | QN | ND | QN | QN |
| 2,4-dimethylphenol | 2.402E-03 | 2.446E-03 | QN | QN | QN | S | S |
| bis(2-chloroethoxy)methane | 2.402E-03 | 2.446E-03 | QN | Q | ND | QN | QN |
| 2,4-dichlorophenol | 2.402E-03 | 2.446E-03 | QN | QN | ND | QN | ND |
| 1,2,4-trichlorobenzene | 2.402E-03 | 2.446E-03 | QN | GN | ND | QN | ΩN |
| naphthalene | 3.145E-03 | 2.446E-03 | 3,894E-05 | 1.113E-05 | 1.766E-02 | 2.134E-07 | 4.416E-03 |
| 4-chloroaniline | 2.402E-02 | 2.446E-02 | QN | QΝ | ND | QN . | QN |
| hexachlorobutadlene | 2.402E-03 | 2.446E-03 | QN | QN | ND | GN | ΩN |
| 4-chloro-3-methylphenol | 2.402E-03 | 2.446E-03 | Q | Q | ND | QN | QN |
| 2-methylnaphthalene | 2.402E-03 | 2,446E-03 | Q | 2 | ND | S | S |
| hexachlorocyclopentadlene | 2.402É-03 | 2.446E-03 | 2 | Q | ON. | QN | ON |
| 2,4,6-trichlorophenol | 2.402E-03 | 2.446E-03 | 9 | <u>Q</u> | QN | QN | Q |

Table B-48: Air Modeling Output Data for Semi-Volatile Organic Compounds - 200 meter location

| | 155mm pi | ropelling charge DODI | 155mm propelling charge M3A1 (zone 3), M284 cannon DODIC: D540 | 84 cannon | No. of rounds (I) release duration (t): | 1- 4 | rounds seconds |
|----------------------------|----------------------------------|--|---|-------------------------------------|--|--|---|
| | δ. | Net Explosive Weight (NEW) in Ibs. Number of Items = 1 SF6 Leak Rate Dilution Factor | ve Weight (NEW) in lbs. => Number of Items = 1 ak Rate Dilution Factor => | 3.50 0.932 | Unit Concentration (UC): | 4.833E-05 | 4.833E-05 (g/m³)/(g/s) |
| | | W.S.C. Linner | A Condition to take to the Array | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background | Average Adjusted Emission Factor | Average Adjusted Emission Factor | Emitted (grams/Item) | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) |
| | (mg/m³) | (mg/m ₃) | EF EF | (Ib/Ib NEW) | Σ | CONC | ER, |
| 2,4,5-trichlorophenol | 2.402E-03 | 2.446E-03 | QΝ | QN | QN | QN | QN |
| 2-chloronaphthalene | 2,402E-03 | 2.446E-03 | QN | QN | ND | QN | QN |
| 2-nitroaniline | 2.402E-03 | 2.446E-03 | ON | QN | DN | ND | QN |
| dimethylphthalate | 2.402E-03 | 2.446E-03 | QN | QN | QN | QN | S |
| 2,6-dinitrotoluene | 2.402E-03 | 2.446E-03 | QN | QN | QN | QN | QN |
| 3-nitroaniline | 4.803E-03 | 4.892E-03 | QN | QN | QN | QN | ΩN |
| 2,4-dinitrophenol | 4.803E-03 | 4.892E-03 | 2 | Q | QN | QN | QN |
| dlbenzofuran | 2.402E-03 | 2.446E-03 | S | Q | ON | ND | ND |
| 2,4-dinitrotoluene | 2.402E-03 | 2,446E-03 | Q | QN | ND | ND | QN |
| 4-nitrophenol | 4.803E-03 | 4.892E-03 | S | 2 | DN | QN | QN |
| 4-chlorophenyl-phenylether | 2.402E-03 | 2,446E-03 | Q | QN | ND | QN | QN |
| diethylphthalate | 2.402E-03 | 2.446E-03 | S | 9 | QN | ON | QN |
| 4-nitroaniline | 4.803E-03 | 4.892E-03 | S | 9 | QN | QN | QN |
| 4,6-dinitro-2-methylphenol | 4.803E-03 | 4.892E-03 | QN | Q | QN | QN | ND |
| n-nitrosodlphenylamine(1) | 2.402E-03 | 2.446E-03 | QN | Q | QN | QN | QN |
| 4-bromophenyl-phenylether | 2.402E-03 | 2,446E-03 | QN | S | QN | QN | QN |
| hexachlorobenzene | 2.402E-03 | 2.446E-03 | Q | Q | QN | QN | QN |
| pentachlorophenol | 4.803E-03 | 4.892E-03 | ND | QN | GN | QN | QN |
| di-n-butyiphthalate | 5.873E-03 | 2.446E-03 | 7.273E-05 | 2.078E-05 | 3.299E-02 | 3.986E-07 | 8.248E-03 |
| butylbenzylphthalate | 2.402E-03 | 2.446E-03 | Q | 2 | QN | QN | QN |
| bis(2-ethylhexyl)phthalate | 7.191E-02 | 1.027E-01 | ND | QN | QN | ON | QN |
| di-n-octylphthalate | 2.402E-03 | 2,446E-03 | Q | QN | ON | QN | QN |
| Footnotes: | | | | | | | |

Footnotes:

ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study)

ND = Not Detected

Table B-49: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acid Gases 200 meter location

| | 155mm propel | ropelling charge DODI | Iling charge M3A1 (zone 3), M284 cannon DODIC: D540 | 84 cannon | No. of rounds (I) release duration (t): | <u> </u> | rounds seconds |
|------------------------|----------------------------------|--------------------------|---|-------------------------------------|---|--|---|
| | S. C. | | • | 2 50 | I half Concentration (LIC): | A 833E_05 | (ala)/(m/a) |
| | | Net Explosive weign | IOSIVE VVEIGIT (INEVV) IN IOS. => Number of Hems = 1 | 9:50 | Oille Concentration (OC). | 4,035E-03 | 4.655E-U5 (g/m)/(g/s) |
| | | SF6 Leak Rate C | Leak Rate Dilution Factor => | 0.932 | | | |
| | | | Ayreo alfinde i co coletar vilo. V | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration | Measured Background | Average Adjusted Emission Factor | Average Adjusted Emission Factor | Emitted (grams/item) | Concentration for One Round (grams/m³) | Emission Kate for One Round (g/sec) |
| | (mg/m³) | Concentration (mg/m³) | (lb/item) EF | (Ib/Ib NEW) | M | CONC | ER, |
| PAHs (TO-13 Method) | | | | ٠ | | | |
| acenaphthylene | 5.329E-04 | 1.027E-05 | 6.472E-06 | 1,849E-06 | 2.936E-03 | 3.547E-08 | 7.339E-04 |
| acenaphthene | 1.682E-04 | 3.180E-04 | QN | QN | QN | QN | QN |
| fluorene | 2,490E-04 | 2.275E-04 | 2.658E-07 | 7.595E-08 | 1.206E-04 | 1.457E-09 | 3.015E-05 |
| phenanthrene | 3.516E-04 | 1.932E-04 | 1.961E-06 | 5.604E-07 | 8.897E-04 | 1.075E-08 | 2.224E-04 |
| anthracene | 5.198E-05 | 7.094E-06 | 5.558E-07 | 1.588E-07 | 2.521E-04 | 3.046E-09 | 6.303E-05 |
| fluoranthene | 1.712E-04 | 1.614E-05 | 1.920E-06 | 5.486E-07 | 8.709E-04 | 1.052E-08 | 2.177E-04 |
| pyrene | 3.254E-04 | 1.663E-05 | 3.823E-06 | 1.092E-06 | 1.734E-03 | 2.095E-08 | 4.335E-04 |
| benzo(a)anthracene | 2.751E-05 | 2.446E-06 | 3.406E-07 | 9.732E-08 | 1.545E-04 | 1.867E-09 | 3.863E-05 |
| chrysene | 2.751E-05 | 2.446E-06 | 3.406E-07 | 9.732E-08 | 1.545E-04 | 1.867E-09 | 3.863E-05 |
| benzo(b)fluoranthene | 7.178E-05 | 2.446E-06 | 8.889E-07 | 2.540E-07 | 4.032E-04 | 4.872E-09 | 1.008E-04 |
| benzo(k)fluoranthene | 4.740E-05 | 2.446E-06 | 5.870E-07 | 1.677E-07 | 2.662E-04 | 3.217E-09 | 6.656E-05 |
| benzo(a)pyrene | 1.089E-04 | 2.446E-06 | 1.349E-06 | 3.854E-07 | 6.119E-04 | 7.393E-09 | 1.530E-04 |
| Indeno(1,2,3-cd)pyrene | 1.530E-04 | 2.935E-06 | 1.858E-06 | 5.309E-07 | 8.428E-04 | 1.018E-08 | 2.107E-04 |
| dlbenz(a,h)anthracene | 5.148E-06 | 2.446E-06 | 6.375E-08 | 1.821E-08 | 2.892E-05 | 3.494E-10 | 7.229E-06 |
| benzo(g,h,i)perylene | 2.715E-04 | 5.626E-06 | 3.292E-06 | 9.406E-07 | 1.493E-03 | 1.804E-08 | 3.733E-04 |
| Dioxin/Furan Data | | | | | | | |
| 2378-TCDD | 4,245E-10 | 8.000E-12 | QN | Q | QN | Q | ΩN |
| 12378-PECDD | 3.225E-10 | 9.000E-12 | QN | QN | QN | 2 | S |
| 123478-HXCDD | 5.490E-10 | 1.050E-11 | QN | Q | QN | ON. | QN |
| 123678-HXCDD | 7.690E-10 | 1.700E-11 | 9.312E-12 | 2.661E-12 | 4.224E-09 | 5,104E-14 | 1.056E-09 |
| 123789-HXCDD | 8.705E-10 | 1.550E-11 | 1.059E-11 | 3.025E-12 | 4.802E-09 | 5.803E-14 | 1.201E-09 |
| 1234678-HPCDD | 9.178E-09 | 2.495E-10 | 1.106E-10 | 3.159E-11 | 5.015E-08 | 6.059E-13 | 1.254E-08 |
| ocpp | 4.458E-08 | 1.587E-09 | 5.324E-10 | 1.521E-10 | 2.415E-07 | 2.918E-12 | 6.037E-08 |
| 2378-TCDF | 1.230E-10 | 1.100E-11 | QN | ON. | QN | ON | QN |
| 12378-PECDF | 3.375E-10 | 1.050E-11 | ON | QN | ND | QN | QN |
| 23478-PECDF | 1.950E-10 | 1.550E-11 | DN | QN | QN | QN | QN |
| 123478-HXCDF | 1.840走-10 | 2.800E-11 | ND | QN | QN | QN | ΩN |
| 123678-HXCDF | 1.795E-10 | 1.450E-11 | Q | 2 | QN | 2 | QN ON |
| 123789-HXCDF | 3.220E-10 | 6.000E-12 | QN | QN | QN | ON | QN |
| | | | | | | | |

Table B-49: Air Modeling Output Data for Polynuclear Aromatic Hydrocarbons, Dioxins/Furans, Aldehydes, and Acld Gases 200 meter location

| ZOU IIIETEI IUCATIOI | | | | | | | |
|--------------------------|-----------------|--|--|------------------|--------------------------|-----------------------------|---|
| | 155mm p | ropeiling charge | 155mm propelling charge M3A1 (zone 3), M284 cannon | 84 cannon | No. of rounds (I) | *- | rounds |
| | | nood | DODIC: D540 | | release duration (t): | 4 | seconds |
| | ΘN | Net Explosive Weight (NEW) in Ibs. | (NEW) in lbs. => | 3.50 | Unit Concentration (UC): | 4.833E-05 | 4.833E-05 (g/m³)/(g/s) |
| | | Number of Items = 1 SF6 Leak Rate Dilution Factor | Number of Items = 1 sk Rate Dilution Factor => | 0.932 | | | |
| | | | Desired Court State | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual | Measured Background | Average Adjusted Emission Factor | Average Adjusted | Emitted (grams/item) | Concentration for One Round | Emission Rate for One Round (d/sec) |
| | (mg/m³) | Concentration (mg/m³) | (lb/ltem) EF | (lb/lb NEW) | Σ | CONC | ER, |
| 234678-HXCDF | 2.640E-10 | 1.200E-11 | QN | . ON | QN | 2 | <u>O</u> N |
| 1234678-HPCDF | 7.080E-10 | 7.750E-11 | 7.808E-12 | 2.231E-12 | 3.541E-09 | 4.279E-14 | 8.854E-10 |
| 1234789-HPCDF | 3.755E-10 | 8.000E-12 | QN | QN | QN | NO | QN |
| OCDF | 1.436E-09 | 1.105E-10 | 1.641E-11 | 4.690E-12 | 7.445E-09 | 8.996E-14 | 1.861E-09 |
| Aldehydes | | | | | | | |
| Formaldehyde | 1.228E-02 | 1.228E-02 | QN | QN | QN | ND | QN |
| Acetaldehyde | 1.802E-02 | 1.802E-02 | QN | QN | ND | ND | QN |
| Acetone | 3.563E-02 | 4.751E-02 | QN | QN | ON | QN | QN |
| Acrolein | 2.294E-02 | 2.294E-02 | QN | QN | QN | ND | QN |
| Proprionaldehyde | 2.374E-02 | 2.374E-02 | QN | QN | QN | QN | QN |
| Crotonaldehyde | 2.867E-02 | 2.867E-02 | QN | QN | QN | ON | QN |
| Butyraldehyde | 2.949E-02 | 2.949E-02 | QN | QN | QN | QN | QN |
| Benzaldehyde | 4.340E-02 | 4,340E-02 | QN | QN | QN | ON | QN |
| Isovaleraldehyde | 3.523E-02 | 3.523E-02 | QN | QN | QN | QN | QN |
| Valeraldehyde | 3.523E-02 | 3.523E-02 | QN | QV | QN | QN | QN |
| o,m,p-Tolualdehyde | 9.828E-02 | 9.828E-02 | QN | QN | QN | ΩN | QN |
| Hexaldehyde | 4.097E-02 | 4.097E-02 | Q | Q | QN | Q | ND |
| 2,5-Dimethylbenzaldehyde | 4.097E-02 | 4.097E-02 | QN | Q | QN | QN | QN |
| Acid gases | | | | | | | |
| Hydrogen fluoride | 1.400E-01 | 1.400E-01 | QN | QN | ON | QN | QN |
| Hydrogen chlorlde | 1.300E-01 | 1.300E-01 | QN | ON | QN | QN | QN |
| Hydrogen bromide | 1.400E-01 | 1.400E-01 | QN | S | ND | QN | ND |
| Nitric Acld | 2.400E-01 | 2.200E-01 | 2,477E-04 | 7.076E-05 | 1.123E-01 | 1.357E-06 | 2.808E-02 |
| Phosphoric acid | 1.400E-01 | 1,400E-01 | 2 | 9 | QN | QN | QN |
| Sulfuric Acid | 2.950E-01 | 1.400E-01 | 3.653E-03 | 1.044E-03 | 1.657E+00 | 2.002E-05 | 4.142E-01 |
| 7000000000 | | | | | | | |

Footnotes: ¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

Table B-50: Air Modeling Output Data for Cyanide and Energetics - 200 meter location

| | 155mm propel | | ling charge M3A1 (zone 3), M284 cannon | 284 cannon | No. of rounds (I) | - | rounds |
|-----------------------------|---|--|--|--|------------------------------|--|--|
| | | חסח | - 1 | | release durauril (1). | 1 | Spinoses |
| ` | e Z | Net Explosive Weigh | osive Weight (NEW) in lbs. => | 3.50 | Unit Concentration (UC): | 4.833E-05 | 4.833E-05 (g/m³)/(g/s) |
| | | Number on SF6 Leak Rate D | Number of items = 1 Leak Rate Dilution Factor => | 0.932 | | | |
| | | AATC FINE | ACCEPTION OF THE PROPERTY OF THE PARTY OF TH | | Total Mass of Substance | Average Modeled | Substance |
| Compound | Measured Actual Concentration (mg/m³) | Measured Background Concentration (mg/m³) | Average Adjusted Emission Factor (Ib/Item) EF | Average Adjusted Emission Factor (Ib/Ib NEW) | Emitted (gramş/ltem) M | Concentration for One Round (grams/m³) | Emission Rate for One Round (g/sec) ER, |
| Particulate Cyanide and HCN | | | | | | | |
| Particulate Cyanide | 8.000E-02 | 8.000E-02 | QN | QN | QN | QN | QN |
| Hydrogen Cyanide | 9,000E-01 | 8.500E-02 | 1.114E-02 | 3.184E-03 | 5,055E+00 | 6.108E-05 | 1.264E+00 |
| Energetics Data | | | | | | | |
| Nitrobenzene | 4.713E-01 | 2.031E-01 | QN | QN | QN | QN | QN |
| 2-Nitrotoluene | 4.713E-01 | 2.031E-01 | QN | QN | QN | ON . | QN |
| 3-Nitrotoluene | 4.713E-01 | 2.031E-01 | Q | ON | ND | ND | QN |
| 4-Nitrotoluene | 4.713E-01 | 2.031E-01 | QΝ | QN | QN | ND | QN |
| Nitroglycerine | 4.713E-01 | 2.031E-01 | ON | QN. | QN | ND | QN |
| 1,3-Dinitrobenzene | 4.713E-01 | 2.031E-01 | QN | ON | QN | ON | QN |
| 2,6-Dinitrotoluene | 4,713E-01 | 2.031E-01 | QN | QN | QN | ND | ON |
| 2,4-Dinitrotoluene | 4.713E-01 | 2.031E-01 | 2 | 2 | QN | ND ND | QN |
| 1,3,5-Trinitrobenzene | 4.713E-01 | 2.031E-01 | Q | Q | QN | Q. | S |
| 2,4,6-Trinitrotoluene | 4.713E-01 | 2.031E-01 | QN | Q | QN | Q. | QN ON |
| RDX | 4.713E-01 | 2.031E-01 | Q | 2 | QN | 9 | Q |
| 4-Amino-2,6-Dinitrotoluene | 4.713E-01 | 2,031E-01 | Q | Q | QN | ΩN | QN |
| 2-Amino-4,6-Dinitrotoluene | 4.713E-01 | 2.031E-01 | Q | SD | ND | ND | QN |
| Tetryl | 4.713E-01 | 2.031E-01 | ON | ON | QN | ND | QN |
| НМХ | 9.426E-01 | 4.062E-01 | QN. | ON. | ND | ND | ON |
| Pentaerythritoltefranitrate | 9.426E-01 | 4.062E-01 | ON | ON | QN | ND | QN |
| Dibutyl phthalate | 2.357E+01 | 1.016E+01 | ON. | 9 | QN | QΝ | ON |
| Dioctyl phthalate | 2.357E+01 | 1.016E+01 | ΩN | 2 | QN | ND ND | QN |
| Diphenylamine | 1.178E+01 | 5.078E+00 | QN | ND | QN | Q | ND |

Footnotes:

¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emissions Study) ND = Not Detected

APPENDIX C

HEALTH-BASED SCREENING LEVELS AND ACUTE TOXICITY VALUES

| Appendix C: Health-based Screening Levels and Acute Toxicity Values | ning Levels ar | nd Acute Tox | cicity Value | 8 | | | | | | | |
|---|----------------|--------------|--------------------------|-----------------------|-----------------------------|---------------------------------|----------------------|----------|--------------------------------|------------|----------------|
| | | | For the | Chronic Eva | he Chronic Evaluation (HBSL | (า8 | | For the | For the Acute Evaluation (ATV) | luation (A | TV) |
| | | Region 9 | Toxicity Endpoint | Region 3 | Toxicity Endpoint | Health-based Screening Level | ERPG | TEEL | AFGL | Source | Acute Toxicity |
| Compound | CAS# | (m/grl) | (c or nc) | (_E m/grl) | (c or nc) | (, m/Brl) | (ng/m ₃) | (,m/grl) | (m/grl) | (T or E) | (hg/m²) |
| Permanent Gases | | | | | | | | | | | |
| NH ₃ | 7664-41-7 | 1.04E+02 | nc | 1.04E+02 | nc | 1.04E+02 | 1.75E+04 | 1.75E+04 | A | ш | 1.75E+04 |
| Carbon Dioxide (CO ₂) | 124-38-9 | NA | | ΝA | | ΑN | ΝΑ | 5.40E+07 | ΑN | ⊥ | 5.40E+07 |
| Carbon Monoxide (CO) | 630-08-0 | 1.57E+02 | | AN | | 1.57E+02 | 2.30E+05 | 2.28E+05 | A | ш | 2.30E+05 |
| Nitrogen Oxides (as NO) | 10024-97-2 | 1.00E+02 | | AN | | 1.00E+02 | NA | 2.70E+05 | NA | T | 2.70E+05 |
| Methane (CH₄) | 74-82-8 | NA | | NA | | NA | NA | 3.30E+06 | NA | Ť | 3.30E+06 |
| Sulfur Dioxide (SO ₂) | 7446-09-5 | 8.00E+01 | | ΑĀ | | 8.00E+01 | 7.89E+02 | 7.86E+02 | ΑĀ | ш | 7.89E+02 |
| Particulate Matter | | | | | | | | | | | |
| TSP | 12789-66-1 | | | ΝΑ | | 5.00E+01 | Ϋ́ | NA | NA | | NA |
| PM ₁₀ | | 5.00E+01 | | NA | | 5.00E+01 | NA | NA | NA | | NA |
| $PM_{2.5}$ | | 1.50E+01 | | NA | | 1.50E+01 | NA | ۷V | ΝA | | NA |
| Metals | | | | | | | | | | | |
| Antimony | 7440-36-0 | NA | | 1.46E+00 | nc | 1.46E+00 | NA | 1.50E+03 | NA | T | 1.50E+03 |
| Arsenic | 7440-38-2 | 4.47E-04 | 2 | 4.15E-04 | C | 4.47E-04 | NA | 3.00E+01 | VΝ | T | 3.00E+01 |
| Barium | 7440-39-3 | 5.21E-01 | วน | 5.11E-01 | nc | 5.21E-01 | NA | 1.50E+03 | NA | T | 1.50E+03 |
| Beryllium | 7440-41-7 | 8.00E-04 | ၁ | 7.45E-04 | ပ | 8.00E-04 | NA | 5.00E+00 | NA | ⊢ | 5.00E+00 |
| Cadmium | 7440-43-9 | 1.07E-03 | ပ | 9.94E-04 | ပ | 1.07E-03 | NA NA | 3.00E+01 | NA | 1 | 3.00E+01 |
| Chromium | 7440-47-3 | | ပ | 1.53E-04 | ပ | 1.53E-04 | NA | 1.50E+03 | Ν | T | 1.50E+03 |
| Cobalt | 7440-48-4 | | | 2.20E+02 | ٦ <u>.</u> | 2,20E+02 | Y Y | 6.00E+01 | Ν | T | 6.00E+01 |
| Copper | 7440-50-8 | _ | | 1.46E+02 | nc | 1.46E+02 | AA | 3.00E+03 | ٧ | ۲ | 3.00E+03 |
| Lead | 7439-92-1 | 1.50E+00 | | NA | | 1.50E+00 | NA | 1.50E+02 | NA | _ | 1.50E+02 |
| Manganese | 7439-96-5 | 5.11E-02 | nc | 5.22E-02 | nc | 5.11E-02 | NA | 3.00E+03 | NA | 1 | 3.00E+03 |
| Nickel | 7440-02-0 | NA | | 7.30E+01 | nc | 7.30E+01 | NA | 3.00E+03 | NA | ⊢ | 3.00E+03 |
| Selenium | 7782-49-2 | | | 1.83E+01 | nc | 1.83E+01 | NA | 6.00E+02 | NA | ⊢ | 6.00E+02 |
| Silver | 7740-22-4 | | | 1.83E+01 | nc | 1.83E+01 | NA | 3.00E+02 | AN | T | 3.00E+02 |
| Thallium | 7440-28-0 | ΑN | | 2.56E-01 | nc | 2.56E-01 | A N | 3.00E+02 | | T | 3.00E+02 |
| Zinc | 7440-66-6 | | | 1.10E+03 | nc | 1.10E+03 | Ϋ́ | 3.00E+04 | AN | _ | 3.00E+04 |
| VOCs | | | | | | | | | | | |
| Dichlorodifluoromethane | 75-71-8 | 2.09E+02 | nc | 1.83E+02 | nc | 2.09E+02 | ΑA | 1.48E+07 | AA | ⊢ | 1.48E+07 |
| Methyl Chloride | 74-87-3 | 2 | S | 1.79E+00 | ပ | 1.07E+00 | Ϋ́ | 2.06E+05 | ¥ | ⊢ | 2.06E+05 |
| Dichlorotetrafluoroethane | 1320-37-2 | _ | | NA NA | | ΑΝ | Ϋ́ | Υ V | ¥ | | NA |
| Vinyl Chloride | 75-01-4 | 2.20E-02 | ပ | 2.10E-02 | C | 2.20E-02 | NA | 1.28E+04 | A | _ | 1.28E+04 |
| 1,3-Butadiene | 106-99-0 | 3.74E-03 | ပ | 3.48E-03 | ပ | 3.74E-03 | 2.20E+04 | 2.21E+04 | NA | ш | 2.20E+04 |
| Methyl Bromide | 74-83-9 | 5.21E+00 | nc | 5.11E+00 | nc | 5.21E+00 | NA | 5.82E+04 | Α | ⊢ | 5.82E+04 |
| Ethyl Chloride | 75-00-3 | 2.32E+00 | nc | ¥. | | 2.32E+00 | NA | 7.92E+06 | ΑN | ⊢ | 7.92E+06 |
| Trichlorofluoromethane | 75-69-4 | 7.30E+02 | пс | 7.30E+02 | nc | 7.30E+02 | Ϋ́ | 2.81E+06 | | J | 2.81E+06 |
| 1,1-Dichloroethene | 75-35-4 | 3.84E-02 | ပ | 3.58E-02 | 0 | 3.84E-02 | Y Y | 7.92E+04 | 5.3 | A | 7.92E+04 |
| Dichloromethane | 7-60-5/ | 4.09E+00 | ٥ | 3.79E+00 | ၀ | 4.09E+00 | 6.96E+05 | | ¥ | E | 6.96E+05 |
| | | | | | | | | | | | |

| | For the Acute Evaluation (ATV) | Acute Toxicity | Source Value | | T 9.58E+06 | T 1.21E+06 | T 7,92E+05 | T 9.76E+03 | T 8.08E+03 | E 1.94E+06 | | E 1.28E+05 | | E 5.38E+05 | T 1.14E+04 | NA | T 1.64E+05 | E 1.88E+05 | T 1.54E+05 | T 6.78E+05 | T 1.38E+05 | T 5.43E+05 | T 6.51E+05 | E 2.13E+05 | | T 6.51E+05 | T 1.25E+05 | T 3.68E+05 | | | T 3.61E+04 | F 6.61E+05 | 7 3.01E+05 | | | T 3.30E+06 | AN | T 4.60E+05 | |
|--|--------------------------------|----------------|-----------------------|-----------------|---------------------------------------|--------------------|------------------------|------------------|--------------------|-----------------------|----------|----------------------|---------------------|------------|------------|------------|-----------------------|------------|-------------------|-------------------|---------------|--------------|----------------------|------------|---------------------------|------------|----------------|------------------------|------------------------|-----------------|---------------------|-------------------|------------------------|---------------------|--------------|------------|---------|------------|--|
| | Acute Eval | | AEGL (uo/m³) | N N | ¥ | ΑN | ¥ | AN | ΑN | ΨN | ΑN | Ą | NA | NA | NA | NA | NA | ΨŽ | NA | NA | AA | NA | Ν | ΑN | ¥ | AN | NA | NA | NA | ΑΝ | ∑ | ¥ | X V | ₹ N | | ¥N | ΑΝ | ΑΝ | |
| | For the | | TEEL (ua/m³) | 9.39F+03 | 9.58E+06 | 1.21E+06 | 7.92E+05 | 9.76E+03 | 8.08E+03 | 1.91E+06 | 1.60E+05 | 1.26E+05 | 5.08E+05 | 5.37E+05 | 1.14E+04 | AN | 1.64E+05 | 1.89E+05 | 1.54E+05 | 6.78E+05 | 1.38E+05 | 5.43E+05 | 6.51E+05 | 2.13E+05 | 2.06E+04 | 6.51E+05 | 1.25E+05 | 3.68E+05 | 1.80E+05 | 5.17E+03 | 3.61E+04 | 0.01=+0.0 | 3 715+04 | 3 20F+04 | | 3.30E+06 | ¥ | 4.60E+05 | |
| | | | ERPG (ug/m³) | 9.39E+03 | ΑN | AN | ΑN | ΑN | _ | 1.94E+06 | _ | 1.28E+05 | NA | 5.38E+05 | NA | NA | NA | 1.88E+05 | NA | NA | NA | NA | NA | 2.13E+05 | ΝA | NA | NA | ΑN | | <u> </u> | | ¥ × | T | 5 | _ | ΑN | ΑN | | |
| | SL) | Health-based | Screening Level | 1.04E+00 | 3.13E+04 | 5.21E+02 | 3.65E+01 | 8.35E-02 | 7.39E-02 | 1.04E+03 | 2.49E-01 | 1.28E-01 | 9.89E-02 | 1.12E+00 | 5.17E-02 | 5.17E-02 | 1.20E-01 | 4.02E+02 | 8.73E-03 | 3.31E+00 | 6.21E+01 | 1.06E+03 | 7.30E+02 | 1.06E+03 | 3.31E-02 | 7.30E+02 | NA | 6.21E+00 | 6.21E+00 | 3.96E-02 | 3.29E+00 | 3.00E-01 | 2.03E+02 | 8.62E-02 | | NA | AN | NA | |
| | r the Chronic Evaluation (HBSL | Toxicity | Endpoint (c.or.ne) | | nc | nc | DU | ပ | ၁ | nc | ၁ | ၁ | ပ | ပ | ပ | ၁ | ၁ | nc | ၁ | ပ | nc | nc | nc | nc | ၁ | nc | | 2 | nc | ပ | 2 | ပ | 2 2 | C | | | | | |
| | Thronic Eva | Region 3 | RBC (ua/m²) | ¥ | 3.14E+04 | 5.11E+02 | 3.65E+01 | 7.70E-02 | 6.88E-02 | 2.30E+03 | 2.16E-01 | 1.18E-01 | 9.21E-02 | 1.04E+00 | 4.82E-02 | 4.82E-02 | 1.12E-01 | 4.16E+02 | 8.24E-03 | 3.13E+00 | 6.21E+01 | 1.06E+03 | 7.30E+03 | 1.04E+03 | 3.13E-02 | 7.30E+03 | ΑN | 6.21E+00 | 6.21E+00 | 3.68E-02 | 3.29E+00 | 2.00E-01 | 2.23E+01 | 8.03E-02 | | ΑN | ΨŽ | Y Y | |
| icity Values | | Toxicity | Endpoint (c or ne) | 2 | 22 | nc | nc | ပ | ၁ | nc | ပ | ပ | ပ | ပ | ပ | ပ | ပ | nc | ပ | ပ | nc | nc | nc | nc | ၁ | nc | | nc S | ဥ | ٥ | ဍ (| 2 2 | | Γ | | | | | |
| d Acute Tox | | Region 9 | PRG (µg/m³) | 1.04E+00 | 3.13E+04 | 5.21E+02 | 3.65E+01 | 8.35E-02 | 7.39E-02 | 1.04E+03 | 2.49E-01 | 1.28E-01 | 9.89E-02 | 1.12E+00 | 5.17E-02 | 5.17E-02 | 1.20E-01 | 4.02E+02 | 8.73E-03 | 3.31E+00 | 6.21E+01 | 1.06E+03 | 7.30E+02 | 1.06E+03 | 3.31E-02 | 7.30E+02 | Ϋ́ | 6.21E+00 | 6.21E+00 | 3.96E-02 | 3.29E+00 | 3.00E-01 | 2.03E+02 | 8.62E-02 | | ΨN | Ϋ́ | NA | |
| g Levels an | | | CAS # | 107-05-1 | 76-13-1 | 75-34-3 | 156-59-2 | 67-66-3 | 107-06-2 | 71-55-6 | 71-43-2 | 56-23-5 | 78-87-5 | 79-01-6 | 10061-01-5 | 10061-02-6 | 79-00-5 | 108-88-3 | 106-93-4 | 127-18-4 | 108-90-7 | 100-41-4 | 108-38-3 106-42-3 | 100-42-5 | 79-34-5 | 95-47-6 | 622-96-8 | 108-67-8 | 95-63-6 | 100-44-7 | 406 46 7 | 05.50.4 | 120-82-1 | 87-68-3 | | 74-82-8 | 74-84-0 | 74-85-1 | |
| Appendix C: Health-based Screening Levels and Acute Toxicity | | | Compound | 3-Chloropropene | 1,1,2-Trichloro-1,2,2-trifluoroethane | 1,1-Dichloroethane | cis-1,2-Dichloroethene | Trichloromethane | 1,2-Dichloroethane | 1,1,1-Trichloroethane | Benzene | Carbon Tetrachloride | 1,2-Dichloropropane | | | e E | 1,1,2-Trichloroethane | Toluene | 1,2-Dibromoethane | Tetrachloroethene | Chlorobenzene | Ethylbenzene | m&p-Xylene | Styrene | 1,1,2,2-Tetrachloroethane | o-Xylene | 4-Ethyltoluene | 1,3,5-Trimethylbenzene | 1,2,4-Trimethylbenzene | Benzyl Chloride | III-Dichlorobenzene | o-Dichlorobenzene | 1.2.4-Trichlorobenzene | Hexachlorobutadiene | Hydrocarbons | Methane | Ethane | Ethylene | |

| Appendix C: Health-based Screening Levels and Acute Toxicity Values | ing Levels ar | ko Jente Tox | ricity Values | | | | | | | | |
|---|---------------|-----------------|--------------------------|-------------|-----------------------------|--|----------|----------------------|--------------------------------|------------|-------------------------|
| | | | For the (| Chronic Eva | he Chronic Evaluation (HBSI | The second secon | | For the | For the Acute Evaluation (ATV) | luation (A | Δ |
| | | Region 9 PRG | Toxicity Endpoint | Region 3 | Toxicity Endpoint | Health-based Screening Level | ERPG | Ä | AEGL | Source | Acute Toxicity Value |
| Compound | CAS# | (,w/brl) | (c or nc) | (µg/m³) | (c or nc) | (hg/m²) | (mg/m,) | (mg/m ₃) | (m/grl) | (T or E) | (h@/m²) |
| Isobutane | 75-28-5 | ٩N | | ₹ | | AN | ΑĀ | 9.52E+05 | ¥ | ⊢ | 9.52E+05 |
| n-Butane | 106-97-8 | ۸A | | NA | | NA | ۸A | 5.71E+06 | NA | L | 5.71E+06 |
| Propylene | 115-07-1 | ΝΑ | | NA | | NA | NA | NA | NA | | NA |
| SVOCs | | | | | | | | | | | |
| n-nitrosodimethylamine | 62-75-9 | 1.37E-04 | ၁ | 1.23E-04 | ၁ | 1.37E-04 | NA | 2.50E+03 | ΑN | _ | 2.50E+03 |
| bis(2-chloroethyl)ether | 111-44-4 | 5.82E-03 | ၁ | 5.69E-03 | ၁ | 5.82E-03 | ¥ | 5.85E+04 | Ν | - | 5.85E+04 |
| phenol | 108-95-2 | 2.19E+03 | nc | 2.19E+03 | nc | 2.19E+03 | AN | 3.85E+04 | ΑN | ⊢ | 3.85E+04 |
| 2-chlorophenol | 95-57-8 | 1.83E+01 | nc | 1.83E+01 | nc | 1.83E+01 | ΑN | 5.25E+03 | AN | ⊢ | 5.25E+03 |
| 1,3-dichlorobenzene | 541-73-1 | 3.29E+00 | nc | 3.29E+00 | nc | 3.29E+00 | NA | 3.61E+04 | NA | F | 3.61E+04 |
| 1,4-dichlorobenzene | 106-46-7 | 3.06E-01 | C | 2.85E-01 | ၁ | 3.06E-01 | NA | 6.61E+05 | AN | | 6.61E+05 |
| 1,2-dichlorobenzene | 95-50-1 | 2.09E+02 | nc | 3.29E+01 | nc | 2.09E+02 | Ν | 3.01E+05 | NA | ⊥ | 3.01E+05 |
| benzyl alcohol | 100-51-6 | 1.10E+03 | nc | 1.10E+03 | nc | 1.10E+03 | NA | 5.53E+04 | NA | 1 | 5.53E+04 |
| bis(2-chloroisopropyl)ether | 108-60-1 | 1.92E-01 | င | 1.79E-01 | ၁ | 1.92E-01 | Ν | 6.99E+04 | NA | ⊢ | 6.99E+04 |
| 2-methylphenol | 95-48-7 | 1.83E+02 | nc | 1.83E+02 | nc | 1.83E+02 | NA | NA | NA | | NA |
| hexachloroethane | 67-72-1 | 4.80E-01 | ပ | 4.47E-01 | ၁ | 4.80E-01 | ۷A | 2.90E+04 | ¥ | _ | 2.90E+04 |
| n-nitroso-di-n-propylamine | 621-64-7 | 9.61E-04 | ၁ | 8.94E-04 | ၁ | 9.61E-04 | NA | 2.00E+02 | ΑN | _ | 2.00E+02 |
| 4-methylphenol | 106-44-5 | 1.83E+02 | nc | 1.83E+02 | nc | 1.83E+02 | NA | NA. | AN | | NA |
| nitrobenzene | 98-95-3 | 2.09E+00 | nc | 2.19E+00 | nc | 2.09E+00 | AN | 1.51E+04 | ¥ | ۰ | 1.51E+04 |
| isophorone | 78-59-1 | 7.08E+00 | ပ | 6.59E+00 | ပ | 7.08E+00 | ٩N | 2.83E+04 | AA | ⊥ | 2.83E+04 |
| 2-nitrophenol | 88-75-5 | NA | | ¥ | | NA | NA | NA | NA | | NA |
| 2,4-dimethylphenol | 105-67-9 | 7.30E+01 | <u>Б</u> | 7.30E+01 | nc | 7.30E+01 | Ν | NA | NA | | NA |
| bis(2-chloroethoxy)methane | 111-91-1 | NA NA | | ΝA | | NA | AN | NA | NA | | ΝΑ |
| 2,4-dichlorophenol | 120-83-2 | 1.10E+01 | nc | 1.10E+01 | nc | 1.10E+01 | NA | 3.00E+04 | NA | 1 | 3.00E+04 |
| 1,2,4-trichlorobenzene | 120-82-1 | 2.08E+02 | nc | 2.08E+02 | nc | 2.08E+02 | NA | 3.71E+04 | NA | - | 3.71E+04 |
| naphthalene | 91-20-3 | 3.13E+00 | nc | 3.29E+00 | nc | 3.13E+00 | NA | 7.86E+04 | NA | 1 | 7.86E+04 |
| 4-chloroaniline | 106-47-8 | 1.46E+01 | nc | 1.46E+01 | nc | 1.46E+01 | AA | | NA | T | 3.00E+04 |
| hexachlorobutadiene | 87-68-3 | 8.62E-02 | ပ | 8.03E-02 | ပ | 8.62E-02 | 3.21E+04 | | NA | Ш | 3.21E+04 |
| 4-chloro-3-methylphenol | 59-50-7 | NA | | Ϋ́ | | NA | NA | 2.00E+04 | NA | ⊢ | 2.00E+04 |
| 2-methylnaphthalene | 91-57-6 | NA | | 7.30E+01 | nc | 7.30E+01 | ΑN | 2.00E+04 | NA | Τ | 2.00E+04 |
| hexachlorocyclopentadiene | 77-47-4 | 7.30E-02 | ٦ <u>.</u> | 7.30E-02 | nc | 7.30E-02 | AN | 2.23E+02 | NA | T | 2.23E+02 |
| 2,4,6-trichlorophenol | 88-06-2 | 1.10E+02 | пС | 1.10E+02 | nc | 1.10E+02 | NA | 3.00E+04 | NA | T | 3.00E+04 |
| 2,4,5-trichlorophenol | 95-95-4 | 3.65E+02 | nc | 3.65E+02 | nc | 3.65E+02 | NA | 3.00E+04 | NA | ⊢ | 3.00E+04 |
| 2-chloronaphthalene | 91-58-7 | 2.92E+02 | nc | 2.92E+02 | nc | 2.92E+02 | NA | 6.00E+02 | NA N | ⊥ | 6.00E+02 |
| 2-nitroaniline | 88-74-4 | 2.09E-01 | nc | 2.08E-01 | nc | 2.09E-01 | NA | Ϋ́ | Ā | | AN |
| dimethylphthalate | 131-11-3 | 3.65E+04 | nc | 3.65E+04 | nc | 3.65E+04 | ΑN | 1.50E+04 | NA | 1 | 1.50E+04 |
| 2,6-dinitrotoluene | 606-20-2 | 3.65E+00 | nc | 3.65E+00 | nc | 3.65E+00 | ۷V | 6.00E+02 | NA | ⊥ | 6.00E+02 |
| 3-nitroaniline | 99-09-2 | NA V | | AN | | NA | Ν | ΑÑ | NA | | ΝΑ |
| 2,4-dinitrophenol | 51-28-5 | 7.30E+00 | nc | 7.30E+00 | nc | 7.30E+00 | NA | 7.50E+03 | NA | Ţ | 7.50E+03 |
| dibenzofuran | 132-64-9 | 1.46E+01 | nc | 1.46E+01 | nc | 1.46E+01 | NA | ΝΑ | NA | | AN |
| | | - | | | | | | | | | |

| Appendix C: Health-based Screening Levels and Acute Toxicity Values | ing Levels a | nd Acute To | xicity Value | S | | | | | | | |
|---|--------------|-------------|--------------|-------------|-----------------------------------|-----------------|---------|----------|-----------------|-------------------------------|-------------------|
| | | | For the | Chronic Eva | For the Chronic Evaluation (HBSL) | | | For the | Acute Eva | For the Acute Evaluation (ATV | 2 |
| | | Region 9 | Toxicity | Region 3 | Toxicity | Health-based | | 200 | N | | Acute Toxicity |
| Compound | CAS# | (hg/m²) | (c or nc) | (m/m/) | (c or ne) | Screening Level | (ua/m³) | | AEGL (ua(m³) | Source | Value (iia/m³) |
| 2,4-dinitrotoluene | 121-14-2 | 7.30E+00 | nc | 7.30E+00 | υC | 7.30E+00 | AN | 6 00F+02 | AN |] 5 - | 6 00E±02 |
| 4-nitrophenot | 100-02-7 | 2.92E+01 | nc | 2.92E+01 | 2 | 2.92E+01 | ¥ | 3.00E+04 | ¥ | - | 3.00F+04 |
| 4-chlorophenyl-phenylether | 7005-72-3 | NA | | NA | | AN | AN | ¥ | Ą | | NA |
| diethylphthalate | 84-66-2 | 2.92E+03 | nc | 2.92E+03 | nc | 2.92E+03 | AN | 1.50E+04 | ¥ | - | 1.50E+04 |
| 4-nitroaniline | 100-01-6 | NA | | ΝA | | NA | NA | 9.00E+03 | A A | F | 9.00E+03 |
| 4,6-dinitro-2-methylphenol | 534-52-1 | NA | | 3.65E-01 | nc | 3.65E-01 | NA | 5.00E+02 | ¥ | ⊢ | 5.00E+02 |
| n-nitrosodiphenylamine(1) | 86-30-6 | 1.37E+00 | ၁ | 1.28E+00 | ၁ | 1.37E+00 | NA | ٩٧ | ¥ | | ¥. |
| 4-bromophenyl-phenylether | 101-55-3 | ΑĀ | | NA | | NA | ΑN | ΑN | ¥. | | AN N |
| hexachlorobenzene | 118-74-1 | 4.18E-03 | ပ | 3.91E-03 | ၁ | 4.18E-03 | ΑN | 7.50E+01 | ΑA | F | 7.50E+01 |
| pentachlorophenol | 87-86-5 | 5.60E-02 | ပ | 5.22E-02 | ၁ | 5.60E-02 | ¥ | 1.50E+03 | AA | | 1.50E+03 |
| di-n-butylphthalate | 84-74-2 | 3.65E+02 | nc | 3.65E+02 | nc | 3.65E+02 | ΑN | 1.50E+04 | ₹ | ⊢ | 1.50E+04 |
| butylbenzylphthalate | 85-68-7 | 7.30E+02 | nc | 7.30E+02 | nc | 7.30E+02 | NA | 5.00E+05 | MA | F | 5.00E+05 |
| bis(2-ethylhexyl)phthalate | 117-81-7 | 4.80E-01 | ပ | 4.47E-01 | ၁ | 4.80E-01 | ¥ | 1.00E+04 | MA | F | 1.00E+04 |
| di-n-octylphthalate | 117-84-0 | 7.30E+01 | nc | 7.30E+01 | nc | 7.30E+01 | ¥ | 1.50E+05 | AA | F | 1.50E+05 |
| PAHS | | | | | | | | | | | |
| acenaphthylene | 208-96-8 | NA | | NA | | ΑN | ¥ | 2.00E+02 | NA NA | - | 2.00E+02 |
| acenaphthene | 83-32-9 | 2.19E+02 | nc | 2.19E+02 | uc | 2.19E+02 | ₹ | 1.25E+03 | NA | Ļ | 1.25E+03 |
| fluorene | 86-73-7 | 1.46E+02 | nc | 1.46E+02 | nc | 1.46E+02 | ¥ | 7.50E+04 | NA N | L | 7.50E+04 |
| phenanthrene | 85-01-8 | ۸A | | AN | | NA | N A | 2.00E+03 | NA | | 2.00E+03 |
| anthracene | 120-12-7 | 1.10E+03 | nc | 1.10E+03 | nc | 1.10E+03 | ¥ | 6.00E+03 | ΝA | | 6.00E+03 |
| fluoranthene | 206-44-0 | 1.46E+02 | nc | 1.46E+02 | nc | 1.46E+02 | ΑĀ | 3.00E+01 | AN | L | 3.00E+01 |
| pyrene | 129-00-0 | 1.10E+02 | nc | 1.10E+02 | nc | 1.10E+02 | NA N | 1.50E+04 | ΑN | F | 1.50E+04 |
| benzo(a)anthracene | 56-55-3 | 2.17E-02 | ၁ | 8.58E-03 | c | 2.17E-02 | ¥ | 6.00E+02 | ΝA | - | 6.00E+02 |
| chrysene | 218-01-9 | 2.17E+00 | ၁ | 8.58E-01 | ၁ | 2.17E+00 | ΑN | 2.00E+02 | ΝA | L | 2.00E+02 |
| benzo(b)fluoranthene | 205-99-2 | 2.17E-02 | ပ | 8.58E-03 | ၁ | 2.17E-02 | ¥ | ΑN | ¥ | | NA |
| benzo(k)fluoranthene | 207-08-9 | 2.17E-01 | ပ | 8.58E-02 | ပ | 2.17E-01 | NA | NA | ΑĀ | | ΑN |
| benzo(a)pyrene | 50-32-8 | 2.17E-03 | ပ | 2.02E-03 | ပ | 2.17E-03 | A | 7.50E+03 | NA | Ţ | 7.50E+03 |
| indeno(1,2,3-cd)pyrene | 193-39-5 | 2.1/E-02 | ပ | 8.58E-03 | ပ | 2.17E-02 | ¥ | Ϋ́ | ¥ | | NA |
| dibenz(a,n)antinacene | 53-70-3 | 2.1/E-03 | ပ | 8.58E-04 | ပ | 2.17E-03 | ₹ | 3.00E+04 | Ϋ́ | - - | 3.00E+04 |
| pierizo(g.n.)peryiene | 191-24-2 | ¥2 | | ΨN | | ∀ N | ¥ | 3.00E+04 | ¥ | ⊢ | 3.00E+04 |
| 2270 Totrophorodik | 4746 04 6 | 00 107 7 | | 30 1177 | | | | | | | |
| 43576 P. 1- FILE 41 | 1/40-01-0 | 4.48E-08 | ٥ | 4.1/E-08 | ပ | 4.48E-08 | Y Y | 3.50E+00 | ΑA | ⊢ | 3.50E+00 |
| 423729-Fernacinorouibenzo-p-dioxin | 40321-70-4 | ¥ | | Y. | | NA NA | ¥ | 2.50E+00 | ¥ Z | _ | 2.50E+00 |
| 1234/8-Hexachlorodibenzo-p-dioxin | 39227-28-6 | ΨV | | ΑN | | NA | Ϋ́ | AN | NA | | ΝΑ |
| 123678-Hexachlorodibenzo-p-dioxin | 57653-85-7 | ΑN | | AA V | | WA | ΨN | 1.50E+01 | NA | ⊢ | 1.50E+01 |
| 123789-Hexachlorodibenzo-p-dioxin | 19408-74-3 | 1.48E-06 | ပ | 1.38E-06 | ၁ | 1.48E-06 | NA | AN | ¥ | | N A |
| 1234678-Heptachlorodibenzo-p-dioxin | 35822-46-9 | ΑN | | ΑN | | AA | ΑN | ΝA | ۸ | | AN |
| Octachlorodibenzo-p-dioxin | 3268-87-9 | AN S | | ¥. | | AA | ¥ | ۸A | ۸A | | NA |
| zoro-retracinorogipenzo-p-ruran | 8-15-70216 | NA | | ¥Z | | ΑN | ₹ | 2.00E+00 | ¥ | ⊢ | 2.00E+00 |
| | | | | | | | | | | | |

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| Appendix C: Health-based Screening Levels and Acute Toxicity Va | ing Levels a | nd Acute Tox | cicity Values | S | | | | | | | |
|---|--------------|---------------------------------------|---------------|-------------|------------------------------|-----------------|----------------------|----------------------|-------------------------------|-------------|----------------|
| | | | For the | Chronic Eve | he Chronic Evaluation (HBSL) | SL.) | | For the | For the Acute Evaluation (ATV | Iluation (A | N. |
| | | Region 9 | Toxicity | Region 3 | Toxicity | Health-based | | | | | Acuta Taylollu |
| | - | PRG | Endpoint | RBC | Endpoint | Screening Level | ERPG | | AEGL | Source | Value |
| Compound | CAS# | (mg/m³) | (c or nc) | (mg/m³) | (c or nc) | (µg/m³) | (mg/m ₃) | (mg/m ₃) | (,m/grl) | (T or E) | (,m/B/I) |
| 2,4-dinitrotoluene | 121-14-2 | 7.30E+00 | nc | 7.30E+00 | nc | 7.30E+00 | ¥ | 6.00E+02 | ΑN | , - | 6 00F+02 |
| 4-nitrophenol | 100-02-7 | 2.92E+01 | nc | 2.92E+01 | nc | 2.92E+01 | ¥ | 3.00E+04 | ¥ | - | 3.00E+04 |
| 4-chlorophenyl-phenylether | 7005-72-3 | ΑN | | NA | | NA | ¥ | ΑN | ¥ | | AN |
| diethylphthalate | 84-66-2 | 2.92E+03 | nc | 2.92E+03 | nc | 2.92E+03 | ¥ | 1.50E+04 | WA | - | 1.50E+04 |
| 4-nitroaniline | 100-01-6 | AA | | NA | | NA | AN | 9.00E+03 | NA | _ | 9.00E+03 |
| 4,6-dinitro-2-methylphenol | 534-52-1 | NA | | 3.65E-01 | nc | 3.65E-01 | ¥ | 5.00E+02 | ¥ | | 5.00E+02 |
| n-nitrosodiphenylamine(1) | 9-08-98 | 1.37E+00 | ၁ | 1.28E+00 | ၁ | 1.37E+00 | ΑN | AN | ¥ | | NA |
| 4-bromophenyl-phenylether | 101-55-3 | A A | | NA | | NA | ¥ | ΑN | ¥ | | NA |
| hexachlorobenzene | 118-74-1 | 4.18E-03 | ပ | 3.91E-03 | ၁ | 4.18E-03 | ΑN | 7.50E+01 | AN | - | 7.50F+01 |
| pentachlorophenol | 87-86-5 | 5.60E-02 | ပ | 5.22E-02 | ၁ | 5.60E-02 | Ν | 1.50E+03 | ¥ | - | 1.50E+03 |
| di-n-butylphthalate | 84-74-2 | 3.65E+02 | nc | 3.65E+02 | nc | 3.65E+02 | ¥ | 1.50E+04 | ¥ | - | 1.50E+04 |
| butylbenzylphthalate | 85-68-7 | 7.30E+02 | nc | 7.30E+02 | nc | 7.30E+02 | ΑĀ | 5.00E+05 | ₩ | L | 5,00E+05 |
| bis(2-ethylhexyl)phthalate | 117-81-7 | 4.80E-01 | ပ | 4.47E-01 | ၁ | 4.80E-01 | ¥ | 1.00E+04 | ¥ | - | 1.00E+04 |
| di-n-octylphthalate | 117-84-0 | 7.30E+01 | nc | 7.30E+01 | nc | 7.30E+01 | ¥ | 1.50E+05 | ¥ | L | 1.50F+05 |
| PAHS | | | | | | | | | | | 20.100.1 |
| acenaphthylene | 208-96-8 | NA | | Ϋ́ | | ¥N | ¥ | 2.00E+02 | Ą | - | 2 00E±02 |
| acenaphthene | 83-32-9 | 2.19E+02 | nc | 2.19E+02 | рu | 2.19E+02 | AA | 1.25E+03 | ¥ | - | 1 25E+03 |
| fluorene | 86-73-7 | 1.46E+02 | nc | 1.46E+02 | DU | 1.46E+02 | ¥ | 7.50E+04 | ΑN | | 7 50F±04 |
| phenanthrene | 85-01-8 | ΑN | | NA | | ΑΝ | A A | 2.00E+03 | ¥ | - | 2.00F+03 |
| anthracene | 120-12-7 | 1.10E+03 | nc | 1.10E+03 | nc | 1.10E+03 | ¥ | 6.00E+03 | ¥ | - | 6.00F+03 |
| . fluoranthene | 206-44-0 | 1.46E+02 | nc | 1.46E+02 | nc | 1.46E+02 | A A | 3.00E+01 | ¥ | - | 3.00F+01 |
| pyrene | 129-00-0 | 1.10E+02 | nc | 1.10E+02 | nc | 1.10E+02 | NA | 1.50E+04 | ¥ | - | 1.50E+04 |
| penzo(a)anthracene | 56-55-3 | 2.17E-02 | ပ | 8.58E-03 | ပ | 2.17E-02 | AN | 6.00E+02 | ¥ | - | 6.00E+02 |
| chrysene | 218-01-9 | 2.17E+00 | O | 8.58E-01 | ပ | 2.17E+00 | NA | 2.00E+02 | ¥ | - | 2.00E+02 |
| penzo(b)tluoranthene | 205-99-2 | 2.17E-02 | O | 8.58E-03 | ပ | 2.17E-02 | NA | Ϋ́ | ¥ | | NA |
| Denzo(k)iiuorantnene | 207-08-9 | 2.17E-01 | ٥ | 8.58E-02 | ပ | 2.17E-01 | NA | NA | ΑA | | NA |
| berizo(a)pyrene | 50-32-8 | 2.1/E-03 | ပ | 2.02E-03 | ပ | 2.17E-03 | WA | 7.50E+03 | NA | ⊥ | 7.50E+03 |
| dibers(a bhathragas | 193-39-5 | 2.1/E-02 | S | 8.58E-03 | O | 2.17E-02 | ¥ | ΑN | ΑM | | NA |
| honzola h imerulene | 404 24 2 | Z. 17E-U3 | اد | 0.38E-U4 | 0 | Z.1/E-03 | ¥. | 3.00E+04 | ΑN | - | 3.00E+04 |
| Dioxins / Firms | 7-47-161 | <u>Ş</u> | | ¥2 | | NA | ¥ | 3.00E+04 | ≨ | - | 3.00E+04 |
| 2378-Tetrachlorodihenzo-n-diovin | 1746.01.B | A ARE OR | , | 4 475 00 | | 20 101 1 | | | | | |
| 12378-Pentachlorodihanzo-n-diovin | 40324 78 A | NA NA | 1 | 4.17 E-00 | 5 | 4.40E-U8 | Ž. | 3.50=+00 | ξ | - | 3.50E+00 |
| 193478 Howardharding a starting | 20027 20 6 | \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ | | ¥. | | NA | ¥Z | 2.50E+00 | ΑN | ⊥ | 2.50E+00 |
| 400070 II | 39221-28-0 | ₹. | | Ϋ́ | | Α¥ | ¥ | ΝΑ | ΑN | | ΑN |
| 123076-Hexachiorodipenzo-p-dioxin | 7-68-869/6 | ¥N, | | ΨN | | AN | Α | 1.50E+01 | NA | L | 1.50E+01 |
| 123763-Hexachlorodibenzo-p-dioxin | 19408-74-3 | 1.48E-06 | ပ | 1.38E-06 | S | 1.48E-06 | NA | NA | ΑA | | ¥ |
| 12346/8-Heptachlorodibenzo-p-dioxin | 35822-46-9 | ¥. | | ΨN. | | NA | NA | NA | Ν | | ΨN |
| 2379 Totrochlorodikoga 6 | 3208-87-9 | ₹. | | ₹. | | NA NA | Ā | NA NA | NA | | Ą |
| 2510-1enacinologicelizo-p-turan | 91207-31-8 | AN | | AN NA | | AA | ¥ | 2.00E+00 | Ϋ́ | F | 2.00E+00 |
| | | | | | | | | | | | |

| Appendix C: Health-based Screening Levels and Acute Toxicity | ing Levels a | nd Acute Tox | ricity Values | | | | | | | | |
|--|---------------|--------------|---------------|-------------|-------------------------------|-----------------|----------|----------|-----------|--------------------------------|-----------------|
| | | | For the | Shronic Evi | r the Chronic Evaluation (HBS | SL.) | | For the | Acute Eva | For the Acute Evaluation (ATV) | 2 |
| | | Region 9 | Toxicity | Region 3 | Toxicity | Health-based | | | | | Actifo Toxioity |
| | | PRG | Endpoint | RBC | Endpoint | Screening Level | ERPG | TEEL | AFGI | Source | Valine |
| Compound | CAS# | (m/Brl) | (c or nc) | (µg/m²) | (c or nc) | (hg/m²) | (,m/Brl) | (,m/grl) | (hg/m²) | (T or E) | (/m/g/) |
| Nitroglycerine | 55-63-0 | 4.80E-01 | ၁ | 4.47E-01 | ၁ | 4.80E-01 | ΑN | ¥ | ¥ | | NA |
| 1,3-Dinitrobenzene | 99-62-0 | 3.65E-01 | nc | 3.65E-01 | nc | 3.65E-01 | ¥ | 3.00E+03 | ¥ | L | 3.00E+03 |
| 2,6-Dinitrotoluene | 606-20-2 | 3.65E+00 | nc | 3.65E+00 | nc | 3.65E+00 | ΑN | 6.00E+02 | ¥ | - | 6.00E+02 |
| 2,4-Dinitrotoluene | 121-14-2 | 7.30E+00 | nc | 7.30E+00 | nc | 7.30E+00 | ΑN | 6.00E+02 | ¥N | - | 6,00E+02 |
| 1,3,5-Trinitrobenzene | 99-35-4 | 1.10E+02 | ńc | 1.10E+02 | nc | 1.10E+02 | AN | 3.00E+04 | ΑN | _ | 3.00E+04 |
| 2,4,6-Trinitrotoluene | 118-96-7 | 2.24E-01 | ပ | 2.09E-01 | ၁ | 2.24E-01 | ΝA | 2.50E+04 | ΑĀ | F | 2,50E+04 |
| RDX | 121-82-4 | 6.11E-02 | ပ | 5.69E-02 | C | 6.11E-02 | ΝA | Ϋ́ | ΝΑ | | NA NA |
| 4-Amino-2,6-Dinitrotoluene | 19406-51-0 | | | NA | | NA | ΑĀ | ΑN | Α¥ | | ¥ |
| 2-Amino-4,6-Dinitrotoluene | 35572-78-2 | | | NA | | NA | Α¥ | 1.50E+04 | ¥ | - | 1.50E+04 |
| Tetryl | 479-45-8 | 3.65E+01 | nc | 3.65E+01 | nc | 3.65E+01 | W | ΨN | ¥ | | ¥ |
| HMX | 2691-41-0 | 1.83E+02 | nc | 1.83E+02 | nc | 1.83E+02 | ¥ | ΑN | NA N | | AN |
| Pentaerythritoltetranitrate | 78-11-5 | NA | | NA | | NA | ¥ | 5.00E+01 | ¥ | - | 5.00E+01 |
| Dibutyl phthalate | 84-74-2 | 3.65E+02 | nc | 3.65E+02 | 2 | 3.65E+02 | ¥ | 1.50E+04 | ¥ | - | 1.50F+04 |
| Dioctyl phthalate | 117-81-7 | 4.80E-01 | ၁ | 4.47E-01 | ပ | 4.80E-01 | ΑN | 1.00E+04 | ¥ | F | 1 00F+04 |
| Diphenylamine | 122-39-4 | 9.13E+01 | nc | 9.13E+01 | 2 | 9.13E+01 | ΑN | 3.00E+04 | ¥ | - | 3.00F+04 |
| Footnotes: | | | | | | | | | | | |
| PRG = Preliminary Remediation Goals | IIS | | | | | 1,000 | | | | | |
| c = cancer | | | | | | | | | | | |
| nc = noncancer | | | | | | | | | | | |
| RBC = Risk-Based Concentrations | | | | | | | | | | | |
| HBSL = Health-Based Screening Level | lei | | | | | | | | | | |
| (E) ERPG = Emergency Response Planning Guildeines | lanning Guilo | leines | | | | | | | | | |
| (T) TEEL = Temporary Emergency Exposure Limits | xposure Limi | S | | | | | | | | † | |
| ATV = Acute Toxicity Value | | | | | | | | | | | |
| NA = Not applicable | | | | | | | | | | | |

APPENDIX D RISK ASSESSMENT DATA

RISK EVALUATION DATA FOR CHARGE M3, FIRED FROM THE M199 CANNON, ZONE 3, 100 METERS DOWNWIND

Table D-1: Comparison of Air Concentrations With Health-Based Values: Gases, Particulates and Metals

| | | 165Mm | i propelling | oharge Dobic | 155mm propelling charge M3 (zone 3), M199 cannon DODIC: DS40 | AT39 cannon | | |
|-----------------------------------|------------------------------|--|--------------------------------|-----------------|---|---------------------------------|-------------|----------|
| Compound | С _{сhronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 12 | С _{асиtе} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | >15 |
| Gases | | | | | | | | |
| NH ₃ | 2.10E+00 | 1.04E+02 | 2.01E-02 | on O | 2.34E+03 | 1.75E+04 | 1.34E-01 | 2 |
| Carbon Dioxide (CO ₂) | 3.28E+01 | ΛN | | na | 1.47E+05 | 5.40E+07 | 2.71E-03 | 2 |
| Carbon Monoxide (CO) | 9.20E+01 | 1.57E+02 | 5.86E-01 | no | 1.03E+05 | 2.30E+05 | 4.46E-01 | 2 |
| Nitrogen Oxides (as NO) | 6.51E-01 | 1.00E+02 | 6.51E-03 | no | 2.91E+03 | 2.70E+05 | 1.08E-02 | 00 |
| Methane (CH₄) | N A | N | | na | ΑN | 3.30E+06 | | БE |
| Sulfur Dioxide (SO ₂) | NA | 8.00E+01 | | na | Ą | 7.89E+02 | | Ba |
| Combined Particulate | | | | | | | | |
| TSP | 4.25E+00 | 5.00E+01 | 8.50E-02 | 2 | 4.74E+03 | ¥X | | eu u |
| PM ₁₀ | 3.22E+00 | 5.00E+01 | 6.43E-02 | on C | 3.59E+03 | A N | | E |
| PM _{2.5} | 1.26E+00 | 1.50E+01 | 8.40E-02 | ဥ | 1.41E+03 | ΑN | | na na |
| Metals | | | | | | | | |
| Antimony | 1.14E-10 | 1.46E+00 | 7.79E-11 | ဥ | 5.08E-01 | 1.50E+03 | 3.39E-04 | 9 |
| Arsenic | 9.89E-05 | 4.47E-04 | 2.21E-01 | 2 | 1.03E+00 | 3.00E+01 | 3.44E-02 | 2 |
| Barium | 5.94E-03 | 5.21E-01 | 1.14E-02 | no | 2.65E+01 | 1.50E+03 | 1.77E-02 | 2 |
| Beryllium | ¥. | 8.00E-04 | | na | NA | 5.00E+00 | | e C |
| Cadmium | 4.31E-05 | 1.07E-03 | 4.04E-02 | no | 4.50E-01 | 3.00E+01 | 1.50E-02 | 2 |
| Chromium | 3.74E-04 | 1.53E-04 | 2.45E+00 | yes | 3.89E+00 | 1.50E+03 | 2.60E-03 | ou |
| Cobait | 7.57E-05 | 2.20E+02 | 3.44E-07 | 2 | 3.38E-01 | 6.00E+01 | 5.64E-03 | OL |
| Copper | 6.98E-01 | 1.46E+02 | 4.78E-03 | 2 | 3.12E+03 | 3.00E+03 | 1.04E+00 | yes |
| Lead | 1.37E-02 | 1.50E+00 | 9.10E-03 | 2 | 6.10E+01 | 1.50E+02 | 4.07E-01 | 0 |
| Wanganese | 2.51E-03 | 5.11E-02 | 4.92E-02 | 2 | 1.12E+01 | 3.00E+03 | 3.74E-03 | 92 |
| NICKO | 1.57E-09 | 7.30E+01 | 2.15E-11 | 2 | 6.99E+00 | 3.00E+03 | 2.33E-03 | 91 |
| Selenium | ΑN | 1.83E+01 | | na | NA | 6.00E+02 | | na |
| Silver | 4.38E-11 | 1.83E+01 | 2.40E-12 | 10 | 1.96E-01 | 3.00E+02 | 6.52E-04 | 92 |
| l hallium | NA | 2.56E-01 | | па | NA | 3.00E+02 | | na |
| Zinc | 9.99E-08 | 1.10E+03 | 9.12E-11 | 2 | 4.46E+02 | 3.00E+04 | 1.49E-02 | 01 |
| Footnote: | | | | | | | | |

NA = Not applicable because compound was not detected. na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

 C_{chronic} = Chronic time-averaged concentration; HBSL = Chronic health-based screening level C_{acute} = Acute concentration; ATV = Acute toxicity value

Table D-2: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

| | | 155mm.pi | o Bulliedo | harge DODIC | 155mm propelling charge M3 (zone 3), M199 cannon DODIC: D540 | A199 cannon | | |
|---------------------------------------|------------------------------|--|--------------------------------|----------------|---|---------------------------------|-------------|------|
| Compound (a) | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronle} / HBSL | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (μg/m³) | Cacute/ ATV | > 1? |
| VOCs | | | | | | | | |
| Dichlorodifluoromethane | ₹ | 2.09E+02 | | na | NA | 1.48E+07 | | na |
| Methyl Chloride | ΑN | 1.07E+00 | | na | NA | 2.06E+05 | | na |
| Dichlorotetrafluoroethane | ΑΝ | NN | | na | NA | AN | | na |
| Vinyl Chloride | NA | 2.20E-02 | • | na | NA | 1.28E+04 | | na |
| 1,3-Butadiene | NA | 3.74E-03 | | na | NA | 2.20E+04 | | na |
| Methyl Bromide | NA | 5.21E+00 | | na | NA | 5.82E+04 | | na |
| Ethyl Chloride | AN | 2.32E+00 | | ua | NA | 7.92E+06 | | na |
| Trichlorofluoromethane | ΑN | 7.30E+02 | | na | NA | 2.81E+06 | | na |
| 1,1-Dichloroethene | 1.46E-03 | 5.21E+02 | 2.80E-06 | ou | 1.63E+00 | 7.92E+04 | 2.06E-05 | 00 |
| Dichloromethane | 4.16E-02 | 4.09E+00 | 1.02E-02 | no | 1.08E+02 | 6.96E+05 | 1.56E-04 | no |
| 3-Chioropropene | NA | 1.04E+00 | | na | NA | 9.39E+03 | | na |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | NA | 3.13E+04 | | na | NA | 9.58E+06 | | na |
| 1,1-Dichloroethane | NA | 5.21E+02 | | na | ΝΑ | 1.21E+06 | | na |
| cis-1,2-Dichloroethene | NA | 3.65E+01 | | na | NA | 7.92E+05 | | na |
| Trichloromethane | NA | 8.35E-02 | | na | NA | 9.76E+03 | | na |
| 1,2-Dichloroethane | NA | 7.39E-02 | | na | ΑΝ | 8.08E+03 | | na |
| 1,1,1-Trichloroethane | NA | 1.04E+03 | | กล | NA | 1.94E+06 | | na |
| Benzene | 1.59E-02 | 2.49E-01 | 6.39E-02 | no | 4.15E+01 | 1.56E+05 | 2.66E-04 | 2 |
| Carbon Tetrachloride | NA | 1.28E-01 | | na | NA | 1.28E+05 | | na |
| 1,2-Dichloropropane | NA | 9.89E-02 | | na | NA | 5.08E+05 | | na |
| Trichloroethene | NA | 1.12E+00 | | na | AA | 5.38E+05 | | na |
| cis-1,3-Dichloropropene | NA | 5.17E-02 | | na | ۷A | 1.14E+04 | | na |
| trans-1,3-Dichloropropene | NA | 5.17E-02 | | na | ٧Z | ΝΑ | | na |
| 1,1,2-Trichloroethane | | 1.20E-01 | | na | Ϋ́ | 1.64E+05 | | na |
| Toluene | 1.08E-03 | 4.02E+02 | 2.69E-06 | on O | 1.20E+00 | 1.88E+05 | 6.43E-06 | n0 |
| 1,2-Dibromoethane | NA | 8.73E-03 | | na | NA | 1.54E+05 | | па |
| Tetrachloroethene | NA | 3.31E+00 | | na | NA | 6.78E+05 | | na |
| Chlorobenzene | NA | 6.21E+01 | | na | Ą | 1.38E+05 | | па |
| Ethylbenzene | NA | 1.06E+03 | | na | N A | 5.43E+05 | | g |
| m&p-Xylene | NA | 7.30E+02 | | na | NA | 6.51E+05 | | na |

Table D-2: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

| Styrene Styrene 1,1,2,2-Tetrachloroethane o-Xylene 4-Ethyltoluene 1,3,5-Trimethylbenzene Benzyl Chloride m-Dichlorobenzene p-Dichlorobenzene | C _{chronlc} (µg/m³) NA NA NA NA NA NA NA NA NA N | Health-Based Screening Level (µg/m³) 1.06E+03 3.31E-02 7.30E+02 NV 6.21E+00 6.21E+00 3.96E-02 3.29E+00 | C _{chronic} /HBSL | 7 | PODIC: D540. Na | Acute Toxicity Value (µg/m³) 2.13E+05 2.06E+04 6.51E+05 1.25E+05 3.68E+05 5.20E+03 3.61E+04 6.61E+04 | Gacute/ ATV | na n |
|--|---|--|----------------------------|---|---|---|-------------|--|
| o-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Hydrocarbons Methane Ethane Ethylene Propane Acetylene Isobutane n-Butane Propylene | NA NA NA NA NA NA NA NA NA | 2.09E+02 2.08E+02 8.62E-02 NV NV NV NV NV NV NV NV NV | | | NA NA NA NA NA NA NA NA NA | 3.01E+05 3.71E+04 3.21E+04 3.30E+06 NA 4.60E+05 3.78E+06 NA 9.52E+05 5.71E+06 | 7.24E-04 | 교 교 교 교 교 교 교 교 교 교 교 교 교 교 교 교 교 교 교 |

NA = Not applicable

na = Not available because health-based screening value is not available or not applicable because compound was not detected.

NV = No value

Schronic = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

Cacute = Acute concentration

ATV = Acute toxicity value

Table D-3: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

| | | 155mm p | ropelling o | sharge DODIC | 155mm propelling charge M3 (Zone 3), M199/Eannon DODIC: D540 | W1991 Cammon | | |
|-----------------------------|------------------------------|--|--------------------------------|-----------------|---|---------------------------------|-------------|------|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chrontc} / HBSL | > 12 | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Gacute/ ATV | > 12 |
| SVOCs | | | | | | | | |
| n-nitrosodimethylamine | NA | 1.37E-04 | | na | NA | 2.50E+03 | | g |
| bis(2-chloroethyl)ether | NA | 5.82E-03 | | na | NA | 5.85E+04 | | na |
| phenol | 1.09E-04 | 2.19E+03 | 5.00E-08 | 2 | 4.89E-01 | 3.85E+04 | 1.27E-05 | 2 |
| 2-chlorophenol | NA | 1.83E+01 | | na | ΑN | 5.25E+03 | | na |
| 1,3-dichlorobenzene | NA | 3.29E+00 | | na | NA | 3.61E+04 | | na |
| 1,4-dichlorobenzene | NA | 3.06E-01 | | na | NA | 6.61E+05 | | na |
| 1,2-dichlorobenzene | NA | 2.09E+02 | | na | NA | 3.01E+05 | | na |
| benzyl alcohol | NA | 1.10E+03 | | · na | NA | 5.53E+04 | | na . |
| bis(2-chloroisopropyl)ether | NA | 1.92E-01 | | na | NA | 6.99E+04 | | na |
| 2-methylphenol | ΑA | 1.83E+02 | | na | NA | NA | | na |
| hexachloroethane | NA | 4.80E-01 | | na | NA | 2.90E+04 | | na |
| n-nitroso-di-n-propylamine | NA | 9.61E-04 | | na | NA | 2.00E+02 | | na |
| 4-methylphenol | NA | 1.83E+02 | | na | NA | ΑN | | na |
| nitrobenzene | NA | 2.09E+00 | | na | NA | 1.51E+04 | | na |
| isophorone | NA | 7.08E+00 | | na | NA | 2.83E+04 | | na |
| 2-nitrophenol | NA AA | ≥ | | na | NA | NA | | na |
| 2,4-dimethylphenol | NA | 7.30E+01 | | na | NA | NA | | na |
| bis(2-chloroethoxy)methane | NA | 2 | | na | NA | NA | | na |
| 2,4-dichlorophenol | NA | 1.10E+01 | | na | NA | 3.00E+04 | | na |
| 1,2,4-trichlorobenzene | NA | 2.08E+02 | | na | NA | 3.71E+04 | | na |
| naphthalene | 2.17E-03 | 3.13E+00 | 6.93E-04 | 00 | 9.68E+00 | 7.86E+04 | 1.23E-04 | no |
| 4-chloroaniline | NA | 1.46E+01 | | na | NA | 3.00E+04 | | na |
| hexachlorobutadiene | NA | 8.62E-02 | | na | NA | 3.21E+04 | | na |
| 4-chloro-3-methylphenol | NA | 2 | | na | NA | 2.00E+04 | | na |
| 2-methyinaphthalene | NA | 7.30E+01 | | na | NA | 2.00E+04 | | na |
| hexachlorocyclopentadiene | NA | 7.30E-02 | | na | NA | 2.23E+02 | | na |
| 2,4,6-trichlorophenol | ΝΑ | 1.10E+02 | | na | NA | NA | | na |
| 2,4,5-trichlorophenol | ΑΝ | 3.65E+02 | | na | ¥. | 3.00E+04 | | na |
| 2-chloronaphthalene | AA | 2.92E+02 | | B | NA | 6.00E+02 | | na |
| 2-nitroaniline | AN . | 2.09E-01 | | na | ΔA | NA | | na |
| dimethylphthalate | AA | 3.65E+04 | | na | ΨN | 1.50E+04 | | na |
| Z,6-dinitrotoluene | AN | 3.65E+00 | | na | NA | 6.00E+02 | | па |

Table D-3: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

| | | 185mm p | ropalling | Harge DODIC | 155mm propelling charge M3 (zone 3), M199 cannon - DODICନ୍ଧର୍ଗଣ | #199 cannon | | |
|----------------------------|------------------------------|--|--------------------------------|----------------|--|---------------------------------|-------------|----------|
| Compound | С _{сhronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 12 | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Gacute/ ATV | > 12 |
| 3-nitroaniline | NA | >≥ | | 'n | NA | 9.00E+03 | | ë |
| 2,4-dinitrophenol | NA | 7.30E+00 | | na | AN | 7.50E+03 | | Ba |
| dibenzofuran | NA | 1.46E+01 | | na | ΑN | NA | | na |
| 2,4-dinitrotoluene | NA | 7.30E+00 | | na | ΨN | 6.00E+02 | | na |
| 4-nitrophenol | NA | 2.92E+01 | | na . | ΑN | 3.00E+04 | | na na |
| 4-chlorophenyl-phenylether | NA | N | | na | AN | AN | | na na |
| diethylphthalate | NA | 2.92E+03 | | na | ΑN | 1.50E+04 | | E |
| 4-nitroaniline | AN A | NV | | na | ΑN | 9.00E+03 | | na |
| 4,6-dinitro-2-methylphenol | NA | 3.65E-01 | | na | AN | 5.00E+02 | | na |
| n-nitrosodiphenylamine(1) | NA | 1.37E+00 | | na | ΑN | ΑN | | na |
| 4-bromophenyl-phenylether | AN | NV | | na | ΑN | NA | | 60 |
| hexachlorobenzene | NA A | 4.18E-03 | | na | ΨN | 7.50E+01 | | na |
| pentachlorophenol | N N | 5.60E-02 | | na | ΑN | 1.50E+03 | | na |
| di-n-butyiphthalate | NA A | 3.65E+02 | | na | ΑN | 1.50E+04 | | na |
| butylbenzylphthalate | N A | 7.30E+02 | | na | ΑN | 5.00E+05 | | ec |
| bis(2-ethylhexyl)phthalate | 4.07E-02 | 4.80E-01 | 8.48E-02 | no | 4.24E+02 | 1.00E+04 | 4.24E-02 | 2 |
| di-n-octylphthalate | AN | 7.30E+01 | | na | NA | 1.50E+05 | | ē |
| -ootnotes: | | | | | | | | |

NA = Not applicable

na = Not available because health-based screening value is not available or not applicable because compound was not detected. NV = No value

Cchronic = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

Cacule = Acute concentration

ATV = Acute toxicity value

| | | J. Learning | n propelling | charge | 155mm propelling charge M3 (zone 3), M199 cannon DODIC; D540 | W199 cannon | | |
|-------------------------------------|------------------------------|--|--------------------------------|---------|---|---------------------------------|-------------|----------|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | C _{acule} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | , 5 |
| PAHs | | | | | | | | |
| acenaphthylene | 3.09E-04 | N | | na | 1.38E+00 | 2.00E+02 | 6.89E-03 | 2 |
| acenaphthene | 3.19E-05 | 2.19E+02 | 1.46E-07 | no | 1.43E-01 | 1.25E+03 | 1.14E-04 | on |
| fluorene | 9.83E-05 | 1.46E+02 | 6.74E-07 | no | 4.39E-01 | 7.50E+04 | 5.86E-06 | 2 |
| phenanthrene | 2.86E-04 | N | | na | 1.28E+00 | 2.00E+03 | 6.40E-04 | 2 |
| anthracene | 2.92E-05 | 1.10E+03 | 2.66E-08 | ou . | 1.30E-01 | 6.00E+03 | 2.17E-05 | 2 |
| fluoranthene | 1.93E-04 | 1.46E+02 | 1.32E-06 | no | 8.62E-01 | 3.00E+01 | 2.87E-02 | 2 |
| pyrene | 5.50E-04 | 1.10E+02 | 5.02E-08 | no | 2.45E+00 | 1.50E+04 | 1.64E-04 | 5 |
| benzo(a)anthracene | 1.21E-05 | 2.17E-02 | 5.56E-04 | no | 1.26E-01 | 6.00E+02 | 2.09E-04 | no Or |
| chrysene | 1.20E-05 | 2.17E+00 | 5.53E-06 | 20 | 1.25E-01 | 2.00E+02 | 6.25E-04 | 01 |
| benzo(b)fluoranthene | 1.85E-05 | 2.17E-02 | 8.54E-04 | no | 4.83E-02 | AN | | na |
| benzo(k)fluoranthene | 2.62E-05 | 2.17E-01 | 1.21E-04 | no | 6.82E-02 | AN | | na |
| benzo(a)pyrene | 4.19E-05 | 2.17E-03 | 1.93E-02 | no | 4.36E-01 | 7.50E+03 | 5.82E-05 | P P |
| indeno(1,2,3-cd)pyrene | 7.85E-05 | 2.17E-02 | 3.62E-03 | n Or | 2.04E-01 | NA | | na |
| dibenz(a,h)anthracene | 2.70E-06 | 2.17E-03 | 1.25E-03 | no | 2.82E-02 | 3.00E+04 | 9.39E-07 | 2 |
| benzo(g,h,i)perylene | 4.17E-04 | N | | na | 1.86E+00 | 3.00E+04 | 6.21E-05 | 2 |
| Dioxins / Furans | | | | | | | | |
| 2378-Tetrachlorodibenzo-p-dioxin | 1.17E-10 | 4.48E-08 | 2.61E-03 | uo | 1.22E-06 | 3.50E+00 | 3.48E-07 | on On |
| 12378-Pentachlorodibenzo-p-dioxin | 8.34E-10 | ⋛ | | na | 3.73E-06 | 2.50E+00 | 1.49E-06 | no |
| 123478-Hexachlorodibenzo-p-dioxin | 1.25E-09 | N N | | na | 1.39E-06 | NA | | na |
| 123678-Hexachlorodibenzo-p-dioxin | 3.63E-09 | N< | | na | 1.62E-05 | 1.50E+01 | 1.08E-06 | ou |
| 123789-Hexachlorodibenzo-p-dioxin | 1.48E-09 | 1.48E-06 | 1.00E-03 | 9 | 3.86E-06 | AN | | na |
| 1234678-Heptachlorodibenzo-p-dioxin | 7.11E-08 | ≥ | | na | 7.94E-05 | NA | | na |
| Octachlorodibenzo-p-dioxin | 4.04E-07 | N | | na | 4.51E-04 | NA | | na |
| 2378-Tetrachlorodibenzo-p-furan | 9.08E-11 | N | | na | 4.06E-07 | 2.00E+00 | 2.03E-07 | no |
| 12378-Pentachlorodibenzo-p-furan | Ā | N | | na | NA | NA | | na |
| 23478-Pentachlorodibenzo-o-furan | 1.07E-10 | NV | | na | 4.80E-07 | 7.50E-02 | 6.40E-06 | 00 |
| 123478-Hexachlorodibenzo-p-furan | 2.31E-10 | Ş | | na | 1.03E-06 | 7.50E+00 | 1.37E-07 | DO OI |
| 123789-Hexachlorodibenzo-p-furan | NA AA | N | | na | NA | NA. | | na |
| 234678-Hexachiorodibenzo-p-furan | NA | N | | na | Ϋ́ | 1.50E+00 | | na |
| 1234678-Heptachlorodibenzo-p-furan | 2.53E-09 | Ş | | na | 2.83E-06 | NA | | na |
| 1234789-Heptachlorodibenzo-p-furan | ., 4.19E-10 | N | | na | 4.68E-07 | NA | | na |
| OCDF | 7.58E-09 | NV | | na | 8.46E-06 | AN | | na |
| Aldehydes | | | | | | | | |
| Formaldehyde | NA | 1.48E-01 | | na | NA | 1.23E+03 | | na |

Table D-4: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aldehydes, and Acid Gases

| | | 165mir | ı propalling | charge DODIC | 165mm propelling charge M3 (zone 3); M199 cannon DODIC::D540 | M199 carinon | | |
|--------------------------|------------------------------|--|--------------------------------|-----------------|---|---------------------------------|-------------|------|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | С _{асиtе} (µg/m³) | Acute Toxicity Value (μg/m³) | Cacute/ ATV | > 1? |
| Acetaldehyde | AN | 8.73E-01 | | na | NA | 1.80E+04 | | na |
| Acetone | AN | 3.65E+02 | | na | AN | 2.37E+06 | | na |
| Acrolein | NA | 2.09E-02 | | na | NA | 2.30E+02 | | na |
| Proprionaldehyde | NA | NΛ | | na | ۷N | 7.50E+04 | | na |
| Crotonaldehyde | AN | 3.54E-03 | | na | VΑ | 5.72E+03 | | na |
| Butyraldehyde | NA | N/ | | , na | ΑN | 7.38E+04 | | ВП |
| Benzaldehyde | NA | 3.65E+02 | | na | AN | 1.50E+04 | | na |
| Isovaleraldehyde | NA | N N | | na | AN | NA | | na |
| Valeraldehyde | NA | N N | | na | AN | AN | | na |
| o,m,p-Tolualdehyde | NA | NV | | na | NA | AN | | na |
| Hexaldehyde | NA | NV | | na | AN | AN | | БП |
| 2,5-Dimethylbenzaldehyde | NA | NV | | na | NA | NA | | na |
| Acid Gases | | | | | | | | |
| Hydrogen fluoride | NA | NN | | na | AN | 1.60E+03 | | na |
| Hydrogen chloride | NA | 2.08E+01 | | na | AN | 4.50E+03 | | na |
| Hydrogen bromide | NA | NV | | na | NA | 9.93E+03 | | na |
| Nitric Acid | NA | NN | | na | AN | 5.16E+03 | | Па |
| Phosphoric acid | NA | 1.04E+01 | | na | NA | 3.00E+03 | | na |
| Sulfuric Acid | NA | NV | | na | NA | 2.00E+03 | | na |
| | | | | | | | | |

Footnote:

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

 ${\sf NV}$ = No value ${\sf C}_{\sf chronic}$ = Chronic time-averaged concentration ; HBSL = Chronic health-based screening level

Cacuta = Acute concentration; ATV = Acute toxicity value

Table D-5: Comparison of Air Concentrations With Health-Based Values: Cyanides and Energetics 100 meter location

| | | 155mi | n propelling | charge DODIC | 155mm propelling charge M3 (20he 3), M199 cannon DODIC: D540 | M199 cannon | | |
|--|------------------------------|--|--------------------------------|-----------------|---|---------------------------------|-------------|------|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chrontc} / HBSL | >12 | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| Particulate Cyanide and Hydrogen Cyanide (CN) | | | | | | | | |
| Particulate Cyanide | ΑΝ | 7.30E+01 | | na | ¥ | 5.00E+03 | | na |
| Hydrogen Cyanide | 5.95E-01 | 3.13E+00 | 1.90E-01 | no | 2.66E+03 | 5.17E+03 | 5.14E-01 | ou |
| Energetics | | | | | | | | , |
| Nitrobenzene | NA | 2.09E+00 | - | na | AA | 1.51E+04 | | na |
| 2-Nitrotoluene | NA | 3.65E+01 | | na | NA | ΑN | | na |
| 3-Nitrotoluene | NA | 3.65E+01 | | na | AN | NA | | na |
| 4-Nitrotoluene | NA | 3.65E+01 | | na | ۸A | 3.37E+04 | | na |
| Nitroglycerine | NA | 4.80E-01 | | na | AN | Ą | | na |
| 1,3-Dinitrobenzene | NA | 3.65E-01 | | na | NA | 3.00E+03 | | na |
| 2,6-Dinitrotoluene | NA | 3.65E+00 | | na | NA | 6.00E+02 | | na |
| 2,4-Dinitrotoluene | NA | 7.30E+00 | | na | AN | 6.00E+02 | | na |
| 1,3,5-Trinitrobenzene | AA | 1.10E+02 | | na | AN | 3.00E+04 | | na |
| 2,4,6-Trinitrotoluene | Ā | 2.24E-01 | | na | ΝA | 2.50E+04 | | na |
| RDX | ΝΑ | 6.11E-02 | | na | NA | ۸A | | na |
| 4-Amino-2,6-Dinitrotoluene | NA | N | | | NA | ΑN | | |
| 2-Amino-4,6-Dinitrotoluene | NA | NV | | | ΝΑ | 1.50E+04 | | |
| Tetryl | ΑΝ | 3.65E+01 | | na | ۸A | NA | | na |
| HMX | AN | 1.83E+02 | | na | AN | ΝΑ | | na |
| Pentaerythritoltetranitrate | NA A | ≥N | | na | NA | 5.00E+01 | | na |
| Dibutyl phthalate | NA | 3.65E+02 | | na | NA | 1.50E+04 | | na |
| Dioctyl phthalate | ΝΑ | 4.80E-01 | | na | NA | 1.00E+04 | | na |
| Diphenylaminė | NA | 9.13E+01 | | na | NA | 3.00E+04 | | na |
| | | | | | | | | |

Footnote:

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

VV = No value

Cchronic = Chronic time-averaged concentration; HBSL = Chronic health-based screening level

Cacute = Acute concentration; ATV = Acute toxicity value

Table D-6: Comparison of Air Concentrations With Health-Based Values: Total Petroleum Hydrocarbons 100 meter location

| | 155mm | l55mm propelling charge M3 (zone 3), M199 cannon DODIC: D540 | lharge M3 (zone 3), M19! DODIC: D540 | 9 cannon |
|--------------------------------------|------------------------------|---|---|------------------------------|
| Compound (a) | C _{chronic} (µg/m³) | С _{сhronic} (µg/m³) | Gehronic (µg/m³) | C _{chronic} (µg/m³) |
| | Allphatic:C<=8 | Allphatic:C>8 | Aromatic:C<≡8 | Aromatic:C>8 |
| Вепzепе | NA | NA | 3.71E-02 | NA |
| Toluene | NA | NA | 1.08E-03 | NA |
| naphthalene | NA | - NA | NA | 2.17E-03 |
| acenaphthylene | NA | NA | NA | 3.09E-04 |
| acenaphthene | NA | NA | ΑN | 3.19E-05 |
| fluorene | NA | AN | ΨN | 9.83E-05 |
| phenanthrene | NA | NA | ۷N | 2.86E-04 |
| anthracene | NA | NA | AN | 2.92E-05 |
| Total (µg/m³) | 0.00E+00 | 0.00E+00 | 3.82E-02 | 2.92E-03 |
| Derived Health-Based Screening Level | 1.92E+04 | 1.04E+03 | 4.17E+02 | 2.09E+02 |
| C _{chronlc} /HBSL | 0.00E+00 | 0.00E+00 | 9.16E-05 | 1.40E-05 |
| >17 | no | no | ou | ou |
| | | | | |

Footnotes:

>1? = is the ratio greater than one?

NA = Not Applicable because compound was not detected

Cohronic = chronic averaged air Concentration (not adjusted for cancer averaging time of 70 years)

HBSL = Health-Based Screening Level

RISK EVALUATION DATA FOR CHARGE M3, FIRED FROM THE M199 CANNON, ZONE 3, 200 METERS DOWNWIND

Table D-7: Comparison of Air Concentrations With Health-Based Values: Gases, Particulates and Metals

200 meter location

| | | 155mm | 1 propelling | charge DODIC | 155mm propelling charge M3 (zone 3), M199 cannon DODIC: D540 | /199 cannon | | |
|-----------------------------------|------------------|--|--------------------------------|-----------------|---|---------------------------------|-------------|--------|
| Compound | Gehronic (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | С _{асиtе} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 1? |
| Gases | | | | | | | | |
| NH3 | 8.36E-01 | 1.04E+02 | 8.02E-03 | ou | 9.33E+02 | 1.75E+04 | 5.33E-02 | no |
| Carbon Dloxide (CO ₂) | 1.31E+01 | ≥N | | eu | 5.83E+04 | 5.40E+07 | 1.08E-03 | OU |
| Carbon Monoxide (CO) | 3.66E+01 | 1.57E+02 | 2.33E-01 | no | 4.09E+04 | 2.30E+05 | 1.78E-01 | no |
| Nitrogen Oxides (as NO) | 2.59E-01 | 1.00E+02 | 2.59E-03 | ou | 1.16E+03 | 2.70E+05 | 4.29E-03 | no |
| Methane (CH₄) | NA | N/ | | na | NA | 3.30E+06 | | na |
| Sulfur Dioxide (SO ₂) | ΑN | 8.00E+01 | | na | NA | 7.89E+02 | | na |
| Combined Particulate | | | | | | | | |
| TSP | 1.69E+00 | 5.00E+01 | 3.38E-02 | ou | 1.89E+03 | AN | | na |
| PM ₁₀ | 1.28E+00 | 5.00E+01 | 2.56E-02 | ou | 1.43E+03 | ΨN | | na |
| PM _{2.5} | 5.02E-01 | 1.50E+01 | 3.34E-02 | ou | 5.60E+02 | ۷N | | na |
| Metals | | · | | | | | | |
| Antimony | 4.53E-11 | 1.46E+00 | 3.10E-11 | 입 | 2.02E-01 | 1.50E+03 | 1.35E-04 | no |
| Arsenic | 3.94E-05 | 4.47E-04 | 8.82E-02 | 2 | 4.10E-01 | 3.00E+01 | 1.37E-02 | no |
| Barlum | 2.36E-03 | 5.21E-01 | 4.53E-03 | no | 1.06E+01 | 1.50E+03 | 7.04E-03 | no |
| Berylllum | NA | 8.00E-04 | | na | NA | 5.00E+00 | | na |
| Cadmlum | 1.72E-05 | 1.07E-03 | 1.61E-02 | ဥ | 1.79E-01 | 3.00E+01 | 5.97E-03 | no |
| Chromlum | 1.49E-04 | 1.53E-04 | 9.74E-01 | 2 | 1.55E+00 | 1.50E+03 | 1.03E-03 | n O |
| Cobalt | 3.01E-05 | 2.20E+02 | 1.37E-07 | 2 | 1.35E-01 | 6.00E+01 | 2.24E-03 | 2 |
| Copper | 2.78E-01 | 1.46E+02 | 1.90E-03 | <u>و</u> | 1.24E+03 | 3.00E+03 | 4.14E-01 | no |
| Lead | 5.44E-03 | 1.50E+00 | 3.62E-03 | 2 | 2.43E+01 | 1.50E+02 | 1.62E-01 | no |
| Manganese | 1.00E-03 | 5.11E-02 | 1.96E-02 | <u>و</u> | 4.47E+00 | 3.00E+03 | 1.49E-03 | no |
| Nickel | 6.23E-10 | 7.30E+01 | 8.54E-12 | 2 | 2.78E+00 | 3.00E+03 | 9.28E-04 | no |
| Selenium | NA | 1.83E+01 | | na | NA | 6.00E+02 | | กล |
| Silver | 1.74E-11 | 1.83E+01 | 9.56E-13 | ou | 7.79E-02 | 3.00E+02 | 2.60E-04 | no |
| Thalllum | NA | 2.56E-01 | | na | ΔN | 3.00E+02 | | na |
| Zinc | 3.98E-08 | 1.10E+03 | 3.63E-11 | 잍 | 1.78E+02 | 3.00E+04 | 5.92E-03 | no |
| | | | | | | | | |

Footnote:

NA = Not applicable because compound was not detected.
na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

C_{chronic} = Chronic time-averaged concentration; HBSL = Chronic health-based screening level C_{scute} = Acute concentration; ATV = Acute toxicity value

1/16/01

Table D-8: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

| 200 meter location | | | | | | | | |
|---------------------------------------|------------------------------|--|---|-----------------------------|---|---------------------------------|-------------|------|
| | | 155mm pr | obelling c | narge M3 (zo DODIC: D540 | 155mm propelling charge M3 (zone 3), M199 cannon DODIC: D540 | n189 cannon | | |
| Compound (a) | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | Cchronte/ HBSL | × 12 | Cacute (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| VOCs | | | | | | | | |
| Dichlorodifluoromethane | Ą | 2.09E+02 | | na | NA | 1.48E+07 | | па |
| Methyl Chloride | AN | 1.07E+00 | | na | NA | 2.06E+05 | | na |
| Dichlorotetrafluoroethane | AN | N | | na | NA | NA | | na |
| Vinyl Chloride | ΝΑ | 2.20E-02 | • | na | NA | 1.28E+04 | | na |
| 1,3-Butadiene | ΝA | 3.74E-03 | | na | NA | 2.20E+04 | | na |
| Methyl Bromide | AN | 5.21E+00 | | na | NA | 5.82E+04 | | na |
| Ethyl Chloride | ΑN | 2.32E+00 | | na | NA | 7.92E+06 | , | na |
| Trichlorofluoromethane | ΑN | 7.30E+02 | | na | NA | 2.81E+06 | | na |
| 1,1-Dichloroethene | 5.82E-04 | 5.21E+02 | 1.12E-06 | no | 6.49E-01 | 7.92E+04 | 8.20E-06 | 20 |
| Dichloromethane | 1.66E-02 | 4.09E+00 | 4.05E-03 | no | 4.31E+01 | 6.96E+05 | 6.20E-05 | 2 |
| 3-Chloropropene | NA | 1.04E+00 | | na | NA | 9.39E+03 | | na |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | NA | 3.13E+04 | | na | AN A | 9.58E+06 | | na |
| 1,1-Dichloroethane | NA | 5.21E+02 | | na | ٩Z | 1.21E+06 | | na |
| cis-1,2-Dichloroethene | AN | 3.65E+01 | | na | ¥. | 7.92E+05 | | na |
| Trichloromethane | AN | 8.35E-02 | | na | AN | 9.76E+03 | | na |
| 1,2-Dichloroethane | AN | 7.39E-02 | | na | ΑN | 8.08E+03 | | na |
| 1,1,1-Trichloroethane | | 1.04E+03 | | na | ΑΝ | 1.94E+06 | | Ba |
| Benzene | 6.34E-03 | 2.49E-01 | 2.55E-02 | 2 | 1.65E+01 | 1.56E+05 | 1.06E-04 | 2 |
| Carbon Tetrachloride | NA | 1.28E-01 | *************************************** | па | Ϋ́ | 1.28E+05 | | na |
| 1,2-Dichloropropane | NA | 9.89E-02 | | na | ΝΑ | 5.08E+05 | | g |
| Trichloroethene | NA | 1.12E+00 | | na | ¥ | 5.38E+05 | | na |
| cis-1,3-Dichloropropene | NA | 5.17E-02 | | Бā | Y N | 1.14E+04 | | na |
| trans-1,3-Dichloropropene | NA | 5.17E-02 | | na | ΑN | ΑΝ | | na |
| 1,1,2-Trichloroethane | NA | 1.20E-01 | | na | AA | 1.64E+05 | | na |
| Toluene | 4.30E-04 | 4.02E+02 | 1.07E-06 | 92 | 4.80E-01 | 1.88E+05 | 2.56E-06 | uo |
| 1,2-Dibromoethane | NA | 8.73E-03 | | па | ¥ | 1.54E+05 | | na |
| Tetrachloroethene | NA | 3.31E+00 | | па | ¥ | 6.78E+05 | | na |
| Chlorobenzene ∵. | NA | 6.21E+01 | | na | ¥N. | 1.38E+05 | | na |
| Ethylbenzene | NA | 1.06E+03 | | na | ΑΑ | 5.43E+05 | | na |
| m&p-Хуlепе | AN | 7.30E+02 | | na | ΑΝ | 6.51E+05 | | na |

Table D-8: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds 200 meter location

| (a) Centrolle (lug/m³) Screening Level (chronic (lug/m³) Screening Level (ug/m³) Screening Level (ug/m³) Screening Level (ug/m³) Screening Level (ug/m³) NA 1.06E+03 na NA 2.1 na NA 2.0 na NA 1.06E+02 na NA 1.20E+02 n | Zuu meter location | | A M Control of | Section 110 pages | A consideration of | | | 2007 - W.W. W. C. C. | |
|--|--------------------------|------------------------------|--|--------------------------------|--------------------|--------------------------|---------------------------------|----------------------|-------------|
| Cohronic (µg/m³) Screening Level (µg/m³) Cohronic (µg/m³) Cohronic (µg/m³) Cohronic (µg/m³) Acute Toxicity NA 1.06E+03 na NA 2.13E+05 NA 3.31E-02 na NA 2.13E+05 NA 7.30E+02 na NA 2.06E+04 NA 7.30E+02 na NA 2.06E+05 NA 7.30E+02 na NA 1.25E+05 NA 6.21E+00 na NA 1.26E+05 NA 3.29E+00 na NA 5.0E+05 NA 3.29E+00 na NA 5.20E+05 NA 3.06E-01 na NA 3.01E+05 NA 2.09E+02 na NA 3.01E+05 NA 3.06E-01 na NA 3.01E+05 NA NA 8.62E-02 na NA 3.01E+05 NA NA NA 3.30E+06 3.30E+06 NA NA NA 3.78E+06 | | | | | DODIC | из (zопе о), п : D540 | rive cannon | | |
| NA 1.06E+03 na NA 2.13E+05 NA 3.31E-02 na NA 2.06E+04 NA 7.30E+02 na NA 6.51E+05 NA 6.21E+00 na NA 1.25E+05 NA 6.21E+00 na NA 1.80E+05 NA 3.96E-02 na NA 5.20E+03 NA 3.29E+00 na NA 5.20E+05 NA 3.06E-01 na NA 5.20E+05 NA 3.06E-02 na NA 5.20E+05 NA 3.06E-02 na NA 3.01E+05 NA NA NA 3.01E+05 NA NA NA NA NA </th <th>Compound (a)</th> <th>C_{chronic} (µg/m³)</th> <th>Health-Based Screening Level (µg/m³)</th> <th>C_{chronle}/ HBSL</th> <th>> 1?</th> <th>Cacute (µg/m³)</th> <th>Acute Toxicity Value (µg/m³)</th> <th>Cacute/ ATV</th> <th>* 12</th> | Compound (a) | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronle} / HBSL | > 1? | Cacute (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | * 12 |
| NA 3.31E-02 na NA 2.06E+04 NA 7.30E+02 na NA 6.51E+05 NA 6.21E+00 na NA 1.25E+05 NA 6.21E+00 na NA 3.68E+05 NA 6.21E+00 na NA 1.80E+05 NA 3.29E+00 na NA 5.20E+03 NA 3.29E+00 na NA 5.20E+05 NA 3.06E-01 na NA 5.20E+05 NA 2.09E+02 na NA 3.01E+05 NA 2.09E+02 na NA 3.01E+05 NA 2.09E+02 na NA 3.21E+04 NA 8.62E-02 na NA 3.21E+04 NA NA NA 3.30E+06 NA NA NA NA NA NA NA NA NA 3.78E+05 NA NA NA NA NA< | Styrene | Ą | 1.06E+03 | | na | ΨZ | 2.13E+05 | | na |
| NA 7.30E+02 na NA 6.51E+05 NA 6.21E+00 na NA 1.25E+05 NA 6.21E+00 na NA 1.26E+05 NA 6.21E+00 na NA 1.80E+05 NA 3.06E-02 na NA 5.20E+03 NA 3.06E-01 na NA 5.20E+03 NA 3.06E-01 na NA 5.20E+04 NA 2.09E+02 na NA 6.61E+05 NA 2.09E+02 na NA 3.71E+04 NA 8.62E-02 na NA 3.71E+04 NA NA 8.62E+02 na NA 3.71E+04 NA NA NA NA 3.71E+04 NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA | ,1,2,2-Tetrachloroethane | ΑN | 3.31E-02 | | na | AA | 2.06E+04 | | na |
| NA NV na NA 1.25E+05 NA 6.21E+00 " na NA 3.68E+05 NA 3.96E-02 na NA 1.80E+05 NA 3.06E-01 na NA 5.20E+03 NA 3.06E-01 na NA 5.20E+03 NA 2.09E+02 na NA 3.61E+04 NA 2.09E+02 na NA 6.61E+05 NA 2.09E+02 na NA 3.71E+04 NA NA 8.62E-02 na NA 3.71E+04 NA NA NA 3.71E+04 1 NA NA NA 3.72E+04 1 NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA | o-Xylene | ΑN | 7.30E+02 | | na | NA | 6.51E+05 | | na |
| NA 6.21E+00 * na NA 3.68E+05 NA 6.21E+00 na NA 1.80E+05 NA 3.96E-02 na NA 5.20E+03 NA 3.06E-01 na NA 5.20E+03 NA 2.09E+02 na NA 6.61E+05 NA 2.09E+02 na NA 3.01E+05 NA NA 3.71E+04 1 NA 8.62E-02 na NA 3.21E+04 NA NA 3.21E+04 1 NA NA 3.21E+04 1 NA NA 3.71E+04 1 NA NA NA 3.71E+04 NA NA NA NA | 4-Ethyltoluene | NA | N/ | | na | AA | 1.25E+05 | | na |
| NA 6.21E+00 na NA 1.80E+05 NA 3.96E-02 na NA 5.20E+03 NA 3.29E+00 na NA 5.20E+03 NA 3.06E-01 na NA 6.61E+05 NA 2.09E+02 na NA 6.61E+05 NA 2.09E+02 na NA 3.71E+04 NA 8.62E-02 na NA 3.71E+04 NA NA 3.21E+04 1.00 NA NA 3.71E+04 1.00 NA NA 3.71E+04 1.00 NA NA 3.71E+04 1.00 NA NA NA 3.78E+06 NA NA NA NA NA NA NA <td< td=""><td>1,3,5-Trimethylbenzene</td><td>NA</td><td>6.21E+00</td><td>•</td><td>na</td><td>NA</td><td>3.68E+05</td><td></td><td>na</td></td<> | 1,3,5-Trimethylbenzene | NA | 6.21E+00 | • | na | NA | 3.68E+05 | | na |
| NA 3.96E-02 na NA 5.20E+03 NA 3.29E+00 na NA 3.61E+04 NA 2.09E+02 na NA 6.61E+05 NA 2.09E+02 na NA 6.61E+05 NA 2.09E+02 na NA 3.71E+04 NA 8.62E-02 na NA 3.71E+04 NA NA 3.21E+04 3.21E+04 NA NA 3.21E+04 NA NA NA 3.71E+04 NA NA NA 3.71E+04 NA NA NA 3.78E+06 NA NA NA NA 3.78E+06 NA NA NA NA NA NA NA NA NA | 1,2,4-Trimethylbenzene | ΑN | 6.21E+00 | | na | AN | 1.80E+05 | | na |
| NA 3.29E+00 na NA 3.61E+04 NA 2.09E+02 na NA 6.61E+05 NA 2.09E+02 na NA 6.61E+05 NA 2.08E+02 na NA 3.71E+04 NA 8.62E-02 na NA 3.21E+04 NA NV na 9.52E+02 3.30E+06 NA NV na NA NA NA NV na NA NA NA NV na NA NA NA NA NA NA 8.52E+05 NA NA NA NA NA | Benzyi Chloride | ΑN | 3.96E-02 | | na | NA | 5.20E+03 | | na |
| NA 3.06E-01 na NA 6.61E+05 NA 2.09E+02 na NA 3.01E+05 NA 8.62E-02 na NA 3.71E+04 NA NA na NA 3.21E+04 NA NV na 9.52E+02 3.30E+06 NA NV na NA NA NA NV na NA 4.60E+05 NA NV na NA NA NA NA NA NA NA NA NA 0.52E+05 NA NA NA NA 8.52E+06 NA NA NA 8.52E+06 NA NA NA 8.52E+06 NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA <td>m-Dichlorobenzene</td> <td>NA</td> <td>3.29E+00</td> <td></td> <td>na</td> <td>NA</td> <td>3.61E+04</td> <td></td> <td>na</td> | m-Dichlorobenzene | NA | 3.29E+00 | | na | NA | 3.61E+04 | | na |
| NA 2.09E+02 na NA 3.01E+05 NA 2.08E+02 na NA 3.71E+04 NA 8.62E-02 na NA 3.21E+04 2.13E-01 NV na 9.52E+02 3.30E+06 NA NV na NA NA NA NV na NA 4.60E+05 NA NV na NA 3.78E+06 NA NA na NA NA | p-Dichlorobenzene | ΝA | 3.06E-01 | | na | NA | 6.61E+05 | | na |
| NA 2.08E+02 na NA 3.71E+04 NA 8.62E-02 na NA 3.21E+04 2.13E-01 NV na 9.52E+02 3.30E+06 NA NV na NA NA NA NV na NA NA NA NV na NA NA NA NA na 9.52E+05 NA NA NA 0.52E+06 NA NA NA NA 0.52E+06 NA NA NA NA 0.52E+06 NA NA NA NA NA NA NA NA NA | o-Dichlorobenzene | ۸A | 2.09E+02 | | na | NA | 3.01E+05 | | na |
| NA 8.62E-02 na NA 3.21E+04 2.13E-01 NV na 9.52E+02 3.30E+06 NA NV na NA NA NA NV na NA NA NA NV na NA NA NA NV na NA 9.52E+05 NA NV na NA NA NA NV na NA 5.71E+06 NA NA NA NA NA | 1,2,4-Trichlorobenzene | ΑN | 2.08E+02 | | na | NA | 3.71E+04 | | na |
| 2.13E-01 NV na 9.52E+02 3.30E+06 NA | Hexachlorobutadiene | NA | 8.62E-02 | | na | NA | 3.21E+04 | | Па |
| 2.13E-01 NV na 9.52E+02 3.30E+06 NA NV na NA NA NA NV na NA 4.60E+05 NA NV na NA NA NA NV na NA 9.52E+05 NA NA 0.52E+06 0.52E+06 NA NA 0.52E+06 0.52E+06 NA NA 0.57E+06 0.57E+06 NA NA NA NA | Hydrocarbons | | | | | | | | |
| NA NV na NA NA NA NA NA NA NA NA NA | Methane | 2.13E-01 | NV | | na | 9.52E+02 | 3.30E+06 | 2.88E-04 | ဥ |
| NA NV na NA NA NA NA NA NA NA NA NA | Ethane | NA | N N | | na | NA | NA | | na |
| NA N | Ethylene | NA | N | | na | NA | 4.60E+05 | | па |
| NA NV na NA NA NV na NA NA NV na NA NA NV na NA | Propane | NA | NV | | na | NA | 3.78E+06 | | na |
| NA NV na | Acetylene | NA | NV | | na | NA | AN | | Па |
| NA | Isobutane | AN | N | | na | NA | 9.52E+05 | | na |
| NA NA NA | n-Butane | NA | N | | na | NA | 5.71E+06 | | na |
| | Propylene | NA | N< | | na | NA | ΑΝ | | na |

Footnotes:

NA = Not applicable

na = Not available because health-based screening value is not available or not applicable because compound was not detected.

NV = No value

Cehronic = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

Cacute = Acute concentration

ATV = Acute toxicity value

Table D-9: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

> 12 (<u>e</u>) na na na na па na ā a na па Ba g Ba 8 29 пa пa шa ā na na na пa 2 g пa g na Cacute/ ATV 4.90E-05 5.05E-06 Acute Toxicity Value (µg/m³) 155mm propelling charge M3 (zone 3), M199 cannon 5.25E+03 3.61E+04 6.61E+05 5.53E+04 6.99E+04 2.90E+04 2.00E+02 3.71E+04 7.86E+04 3.00E+04 3.21E+04 2.83E+04 2.00E+04 2.23E+02 6.00E+02 1.50E+04 6.00E+02 3.85E+04 3.01E+05 1.51E+04 3.00E+04 2.00E+04 3.00E+04 A A A ₹ ¥ ₹ Cacute (µg/m³) 3.85E+00 A A A A A **\$\$\$\$\$\$**\$ X X X X ¥ ¥ **44444** A A A **Dodic: 0340** > 12 na ш B na na па 멸 na na na na na <u>e</u> B Б na 2 na В a na ā g 2 g ē na 2.76E-04 1.99E-08 Gehronte/ HBSL Screening Level Health-Based 3.65E+02 2.92E+02 2.09E-01 3.65E+04 1.10E+01 2.08E+02 3.13E+00 3.29E+00 3.06E-01 1.10E+03 1.92E-01 1.83E+02 2.09E+00 7.30E+01 8.62E-02 1.10E+02 2.19E+03 .83E+02 7.08E+00 7.30E-02 (hg/m³) 1.37E-04 2.09E+02 9.61E-04 1.46E+01 7.30E+01 1.83E+01 4.80E-01 2 ⋛ Cchronic (µg/m³) 8.63E-04 4.36E-05 in a second **\$\$\$\$** ¥ **\$\$\$\$ 4444** Z Z Z ₹ ΑN ₹ **\$\$\$\$**\$ Ž 200 meter location bis(2-chloroethoxy)methane hexachlorocyclopentadiene bis(2-chlorolsopropyl)ether n-nitroso-di-n-propylamine 4-chloro-3-methylphenol n-nitrosodimethylamine 1,2,4-trichlorobenzene 2-methylnaphthalene bis(2-chloroethyl)ether hexachlorobutadiene 2,4,6-trichlorophenol 2,4,5-trichlorophenol 2-chloronaphthalene ,3-dichlorobenzene 1,4-dichlorobenzene 1,2-dichlorobenzene 2,4-dichlorophenol 2,4-dimethylphenol dimethylphthalate 2,6-dinitrotoluene hexachloroethane 2-methylphenol 4-methylphenol 4-chloroaniline 2-chlorophenol benzyl alcohol nitrobenzene 2-nitrophenol 2-nitroaniline naphthalene Compound isophorone SVOCS phenol

Table D-9: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

| | | 155mm ք | ropelling | sharge DODIC | 155mm propelling charge M3 (zone 3), M199 cannon bObic: D540 | 4199 cannon | | |
|----------------------------|------------------|--|--------------------------------|-----------------|---|---------------------------------|-------------|------|
| Compound | Gehronic (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 1? |
| 3-nltroanlline | ΑN | ≥ N | | na | NA | 9.00E+03 | | na |
| 2,4-dinitrophenol | NA | 7.30E+00 | | na | NA | 7.50E+03 | | na |
| dibenzofuran | ΑN | 1.46E+01 | | na | ΑN | ΨN | | na |
| 2,4-dinitrotoluene | NA | 7.30E+00 | | na | NA | 6.00E+02 | | na |
| 4-nitrophenol | ΑN | 2.92E+01 | | na | NA | 3,00E+04 | | na |
| 4-chlorophenyl-phenylether | Ν | N\ | | na | NA | NA | | na |
| diethylphthalate | NA | 2.92E+03 | | na | NA | 1.50E+04 | | na |
| 4-nitroaniline | NA | N\ | | na | NA | 9.00E+03 | | na |
| 4,6-dinitro-2-methylphenol | NA | 3.65E-01 | | na | NA | 5.00E+02 | | na |
| n-nitrosodiphenylamine(1) | NA | 1.37E+00 | | na | NA | NA | | na |
| 4-bromophenyl-phenylether | AN | NV | į | na | NA | NA | | na |
| hexachlorobenzene | ΝΑ | 4.18E-03 | | na | AN | 7.50E+01 | | na |
| pentachlorophenol | AN | 5.60E-02 | | na | AN | 1.50E+03 | | na |
| dl-n-butylphthalate | NA | 3.65E+02 | | na | AN | 1.50E+04 | | na |
| butylbenzylphthalate | NA | 7.30E+02 | | na | AN | 5.00E+05 | | na |
| bis(2-ethylhexyl)phthalate | 1.62E-02 | 4.80E-01 | 3.38E-02 | 5 | 1.69E+02 | 1.00E+04 | 1.69E-02 | no |
| di-n-octylphthalate | NA | 7.30E+01 | | na | NA | 1.50E+05 | | na |
| -11 | | | | | | | | |

Footnotes:

NA = Not applicable

na = Not available because health-based screening value is not available or not applicable because compound was not detected.

NV = No value

Ccirconic = Chronic time-averaged concentration HBSL = Chronic health-based screening level

Cacute = Acute concentration

ATV = Acute toxicity value

Table D-10: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aldehydes, and Acid Gases

| 200 meter location | | ARRING | Tallianes - | all all and a | AND STATES CHART CHART ON STATES 2) NATIONAL STATES | MAGO AMODAG | | |
|-------------------------------------|------------------------------|--|--------------------------------|---------------|--|---------------------------------|-------------|----------|
| | | Section Section 3. | | | DODIC: D540 | n se camion. | | |
| Compound | С _{сһгопіс} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| PAHs | | | | | | | | |
| acenaphthylene | 1.23E-04 | N/ | | na | 5.49E-01 | 2.00E+02 | 2.74E-03 | 2 |
| acenaphthene | 1.27E-05 | 2.19E+02 | 5.81E-08 | no | 5.68E-02 | 1.25E+03 | 4.54E-05 | OL |
| fluorene | 3.92E-05 | 1.46E+02 | 2.68E-07 | uo | 1.75E-01 | 7.50E+04 | 2.33E-06 | DO. |
| phenanthrene | 1.14E-04 | N | | na | 5.09E-01 | 2.00E+03 | 2.55E-04 | 20 |
| anthracene | 1.16E-05 | 1.10E+03 | 1.06E-08 | no | 5.18E-02 | 6.00E+03 | 8.64E-06 | 2 |
| fluoranthene | 7.69E-05 | 1.46E+02 | 5.27E-07 | no | 3.43E-01 | 3.00E+01 | 1.14E-02 | no |
| pyrene | 2.19E-04 | 1.10E+02 | 2.00E-06 | no | 9.77E-01 | 1.50E+04 | 6.51E-05 | on O |
| benzo(a)anthracene | 4.80E-06 | 2.17E-02 | 2.21E-04 | no | 5.00E-02 | 6.00E+02 | 8.33E-05 | 2 |
| chrysene | 4.78E-06 | 2.17E+00 | 2.20E-06 | no | 4.98E-02 | 2.00E+02 | 2.49E-04 | 2 |
| benzo(b)fluoranthene | 7.37E-06 | 2.17E-02 | 3.40E-04 | no | 1.92E-02 | NA | | na |
| benzo(k)fluoranthene | 1.04E-05 | 2.17E-01 | 4.80E-05 | no | 2.71E-02 | NA | | na |
| benzo(a)pyrene | 1.67E-05 | 2.17E-03 | 7.68E-03 | no | 1.74E-01 | 7.50E+03 | 2.32E-05 | 00 |
| Indeno(1,2,3-cd)pyrene | 3.13E-05 | 2.17E-02 | 1.44E-03 | no | 8.14E-02 | NA | | na |
| dibenz(a,h)anthracene | 1.08E-06 | 2.17E-03 | 4.96E-04 | no | 1.12E-02 | 3.00E+04 | 3.74E-07 | 22 |
| benzo(g,h,l)perylene | 1.66E-04 | Ž | | na | 7.41E-01 | 3.00E+04 | 2.47E-05 | OU Ou |
| Dioxins / Furans | | | | | | | | |
| 2378-Tetrachlorodibenzo-p-dloxin | 4.66E-11 | 4.48E-08 | 1.04E-03 | uo O | 4.86E-07 | 3.50E+00 | 1.39E-07 | ou |
| 12378-Pentachlorodibenzo-p-dioxin | 3.32E-10 | N | | na | 1.48E-06 | 2.50E+00 | 5.93E-07 | no |
| 123478-Hexachlorqdibenzo-p-dioxin | 4.96E-10 | N | | na | 5.54E-07 | NA | | na |
| 123678-Hexachlorodibenzo-p-dioxin | 1.44E-09 | ≥ | | na | 6.45E-06 | 1.50E+01 | 4.30E-07 | ou |
| 123789-Hexachlorodibenzo-p-dloxin | 5.90E-10 | 1.48E-06 | 3.99E-04 | no | 1.54E-06 | NA | | na |
| 1234678-Heptachlorodlbenzo-p-dloxin | 2.83E-08 | Ž. | | na | 3.16E-05 | AA A | | na |
| Octachlorodibenzo-p-dioxin | 1.61E-07 | N/ | | na | 1.80E-04 | NA | | na . |
| 2378-Tetrachlorodibenzo-p-furan | 3.62E-11 | 2 | | na | 1.61E-07 | 2.00E+00 | 8.07E-08 | no Ou |
| 12378-Pentachlorodibenzo-p-furan | NA | N | | na | NA | NA | | na |
| 23478-Pentachlorodibenzo-o-furan | 4.28E-11 | ≥ | | na | 1.91E-07 | 7.50E-02 | 2.55E-06 | no |
| 123478-Hexachlorodibenzo-p-furan | 9.19E-11 | ≥ | | na | 4.10E-07 | 7.50E+00 | 5.47E-08 | no |
| 123789-Hexachlorodibenzo-p-furan | NA | 2 | | na | NA | NA | | na |
| 234678-Hexachlorodibenzo-p-furan | NA | ⋛ | | na | NA | 1.50E+00 | | na |
| 1234678-Heptachlorodibenzo-p-furan | 1.01E-09 | N | | na | 1.12E-06 | NA | | na |
| 1234789-Heptachiorodibenzo-p-furan | 7, 1.67E-10 | N | | na | 1.86E-07 | NA | | na |
| OCDF | 3.02E-09 | N | | na | 3.37E-06 | NA | | na |
| Aldehydes | | 70 407 7 | | | | | | |
| Formaldenyde | NA NA | 1.48E-01 | | na | NA | 1.23E+03 | | na |

Table D-10: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aldehydes, and Acid Gases 200 meter location

| | | Jesmin. | n propelling | charge, DODIC | 155mm propelling charge M3 (zone 3), M199 cannon BODIC: BS40 | M199 cannon | Section 19 | And the second s |
|--------------------------|------------------------------|--|------------------------|------------------|---|---------------------------------|---|--|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / | > 13 | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| Acetaldehyde | ΑN | 8.73E-01 | | na | Ą | 1.80E+04 | | na |
| Acetone | NA | 3.65E+02 | | na | NA | 2.37E+06 | | na |
| Acrolein | AN | 2.09E-02 | | ББ | NA | 2.30E+02 | | na |
| Proprionaldehyde | AN | N | | na | NA | 7.50E+04 | | na |
| Crotonaldehyde | AN A | 3.54E-03 | | na | NA | 5.72E+03 | | na |
| Butvraldehyde | NA | N | | , na | NA | 7.38E+04 | | na |
| Benzaldehyde | AN | 3.65E+02 | | na | NA | 1.50E+04 | | na |
| Isovateraldehyde | ĄN | W | | na | NA | NA | | na |
| Valeraldehyde | ΑΝ | N | | na | NA | NA | | na |
| o,m,p-Tolualdehyde | NA | NV | | na | NA | AN | | na |
| Hexaldehyde | ĄN | NV | | na | AN | NA | | na |
| 2,5-Dimethylbenzaldehyde | NA | NV | | na | NA | NA | | na |
| Acid Gases | | | | | | | | |
| Hydrogen fluoride | ΑN | N/ | | na | NA | 1.60E+03 | | na |
| Hydrogen chloride | ¥ | 2.08E+01 | | na | AN | 4.50E+03 | | na |
| Hydrogen bromide | NA | N< | | na | AN | 9.93E+03 | | na |
| Nitric Acid | NA | NN | | Bu | NA | 5.16E+03 | | na |
| Phosphoric acid | A | 1.04E+01 | | na | NA | 3.00E+03 | | na |
| Sulfuric Acid | NA | NV | | na | NA | 2.00E+03 | | na |
| | | | | | | | | |

Footnote:

NA = Not applicable because compound was not detected. na = Not available or not applicable if compound was not detected.

NV = No value

 $C_{chronic}$ = Chronic time-averaged concentration; HBSL = Chronic health-based screening level C_{scute} = Acute concentration; ATV = Acute toxicity value

Table D-11: Comparison of Air Concentrations With Health-Based Values: Cyanides and Energetics 200 meter location

| | | 165mi | n propelling | charge DODIC | 155mm propelling charge M3 (zone 3), M199 cannon DØDIC: D540 | #199 cannon | | |
|--|------------------------------|--|--------------------------------|-----------------|---|---------------------------------|-------------|---------|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | G _{chrontc} / HBSL | > 1? | С _{асиte} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| Particulate Cyanide and Hydrogen Cyanide (CN) | | | | | | | | |
| Particulate Cyanide | NA | 7.30E+01 | | na | ΑN | 5.00E+03 | | Ba |
| Hydrogen Cyanide | 2.37E-01 | 3.13E+00 | 7.57E-02 | no | 1.06E+03 | 5.17E+03 | 2.05E-01 | 2 |
| Energetics | | | | | | | | |
| Nitrobenzene | NA | 2.09E+00 | • | na | NA | 1.51E+04 | | na |
| 2-Nitrotoluene | NA | 3.65E+01 | | na | NA | NA | | na |
| 3-Nitrotoluene | NA | 3.65E+01 | | na | NA | ΑN | | na |
| 4-Nitrotoluene | NA | 3.65E+01 | | na | NA | 3.37E+04 | | na |
| Nitroglycerine | NA | 4.80E-01 | | na | NA | NA | | na |
| 1,3-Dinitrobenzene | NA A | 3.65E-01 | | na | NA | 3.00E+03 | | па |
| 2,6-Dinitrotoluene | NA | 3.65E+00 | | na | NA | 6.00E+02 | | na |
| 2,4-Dinitrotoluene | NA | 7.30E+00 | | na | NA | 6.00E+02 | | na |
| 1,3,5-Trinitrobenzene | NA | 1.10E+02 | | na | AN | 3.00E+04 | | БП |
| 2,4,6-Trinitrotoluene | A A | 2.24E-01 | | na | NA | 2.50E+04 | | па |
| RDX | NA | 6.11E-02 | | na | NA | NA | | EL E |
| 4-Amino-2,6-Dinitrotoluene | ΑĀ | Š | | | NA | NA | | |
| 2-Amino-4,6-Dinitrotoluene | NA | N N | | | NA | 1.50E+04 | | |
| Tetryl | NA | 3.65E+01 | | na | NA | NA | | na |
| HMX | NA | 1.83E+02 | | na | NA | NA | | na |
| Pentaerythritoltetranitrate | NA | S | | na | AN | 5.00E+01 | | na |
| Dibutyl phthalate | NA | 3.65E+02 | | na | NA | 1.50E+04 | | na |
| Dioctyl phthalate | NA | 4.80E-01 | | na | NA | 1.00E+04 | | na |
| Diphenylamine | NA | 9.13E+01 | | na | NA | 3.00E+04 | | na |
| 7 | | | | | | | | |

Footnote:

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

Cenronic = Chronic time-averaged concentration; HBSL = Chronic health-based screening level

Cacute = Acute concentration; ATV = Acute toxicity value

Table D-12: Comparison of Air Concentrations With Health-Based Values: Total Petroleum Hydrocarbons 200 meter location

| | 185mm | 155mm propelling charge M3 (zone 3), M199 cannon DODIC: D540 | harge M3 (zone 3), M19) DODIC: D540 | J cannon |
|--------------------------------------|------------------------------|---|--|------------------|
| Compound (a) | C _{chronic} (µg/m³) | C _{chronic} (µg/m³) | С _{сьтопіс} (µg/m³) | Cehronic (µg/m³) |
| | Aliphatic:C<=8 | Aliphatic:C>8 | Aromatic:C<=8 | Aromatic:C>8 |
| Benzene | NA | NA | 1.48E-02 | AN |
| Toluene | NA | NA | 4.30E-04 | NA |
| naphthalene | AN | , NA | NA | 8.63E-04 |
| acenaphthylene | AN | NA | NA | 1.23E-04 |
| acenaphthene | NA | NA | NA | 1.27E-05 |
| fluorene | ΝA | NA | NA | 3.92E-05 |
| phenanthrene | NA | NA | NA | 1.14E-04 |
| anthracene | NA | NA | NA | 1.16E-05 |
| Total (µg/m³) | 0.00E+00 | 0.00E+00 | 1.52E-02 | 1.16E-03 |
| Derived Health-Based Screening Level | 1.92E+04 | 1.04E+03 | 4.17E+02 | 2.09E+02 |
| C _{chronic} /HBSL | 0.00E+00 | 0.00E+00 | 3.65E-05 | 5.58E-06 |
| >1? | ou | no | no | no |
| Footnotes: | | | | |

>1? = Is the ratio greater than one?

NA = Not Applicable because compound was not detected

Cehronic = chronic averaged air Concentration (not adjusted for cancer averaging time of 70 years)

HBSL = Health-Based Screening Level

RISK EVALUATION DATA FOR CHARGE M3, FIRED FROM THE M284 CANNON, ZONE 3, 100 METERS DOWNWIND

Table D-13: Comparison of Air Concentrations With Health-Based Values: Gases, Particulates and Metals

| | | III.(S) | n:propelling | Charge | 155mim propelling charge W3 (zone 3), M264 cannon DØDIC: D540 | W284 cannon | | |
|---|------------------------------|--|--------------------------------|----------|--|---------------------------------|-------------|----------|
| Compound | С _{ећгопіс} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 12 | С _{асиtе} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 1? |
| Gases | | | | | | | | |
| NH ₃ | 2.22E+00 | 1.04E+02 | 2.13E-02 | 2 | 2.48E+03 | 1.75E+04 | 1.42E-01 | 2 |
| Carbon Dioxide (CO ₂) | 3.81E+01 | ۸N | | na | 1.70E+05 | 5.40E+07 | 3.15E-03 | 2 |
| Carbon Monoxide (CO) | 9.87E+01 | 1.57E+02 | 6.29E-01 | no | 1.10E+05 | 2.30E+05 | 4.79E-01 | 2 |
| Nitrogen Oxides (as NO) | 7.96E-01 | 1.00E+02 | 7.96E-03 | no | 3.55E+03 | 2.70E+05 | 1.32E-02 | 2 |
| Methane (CH₄) | NA | NV | | na | ۷N | 3.30E+06 | | БП |
| Sulfur Dioxide (SO ₂) | NA | 8.00E+01 | | na | NA | 7.89E+02 | | Бã |
| Combined Particulate | | | | | | | | |
| TSP | 2.93E+00 | 5.00E+01 | 5.86E-02 | 2 | 3.27E+03 | AA | | en |
| PM ₁₀ | 2.52E+00 | 5.00E+01 | 5.03E-02 | 2 | 2.81E+03 | ΑN | | Ba |
| . PM _{2.5} | 1.35E+00 | 1.50E+01 | 8.97E-02 | 2 | 1.50E+03 | ΑN | | g |
| Metals | | | | | | | | |
| Antlmony | ΝΑ | 1.46E+00 | | na | ΝΑ | 1.50E+03 | | na |
| Arsenic | 7.83E-05 | 4.47E-04 | 1.75E-01 | no | 8.16E-01 | 3.00E+01 | 2.72E-02 | 92 |
| Barlum | 1.83E-03 | 5.21E-01 | 3.50E-03 | 0L | 8.15E+00 | 1.50E+03 | 5.44E-03 | 2 |
| Beryllium | NA | 8.00E-04 | | na | AN | 5.00E+00 | | na |
| Cadmium | ΝΑ | 1.07E-03 | | na | NA | 3.00E+01 | | na |
| Chromlum | 1.38E-04 | 1.53E-04 | 9.04E-01 | 2 | 1.44E+00 | 1.50E+03 | 9.59E-04 | 2 |
| Cobalt | 5.44E-05 | 2.20E+02 | 2.47E-07 | о С | 2.43E-01 | 6.00E+01 | 4.05E-03 | 2 |
| Copper | 1.70E-01 | 1.46E+02 | 1.16E-03 | 2 | 7.58E+02 | 3,00E+03 | 2.53E-01 | 2 |
| Lead | 1.56E-02 | 1.50E+00 | 1.04E-02 | 2 | 6.96E+01 | 1.50E+02 | 4.64E-01 | Du Ou |
| Manganese | 1.29E-03 | 5.11E-02 | 2.52E-02 | 2 | 5.75E+00 | 3.00E+03 | 1.92E-03 | no |
| Nickel | 5.59E-10 | 7.30E+01 | 7.66E-12 | <u>ы</u> | 2.50E+00 | 3.00E+03 | 8.32E-04 | 2 |
| Selenium | AA A | 1.83E+01 | | na | NA | 6.00E+02 | | na |
| Silver | NA NA | 1.83E+01 | | na | NA | 3.00E+02 | | na |
| Thallium | ΑN | 2.56E-01 | | na | NA | 3.00E+02 | | na |
| Zinc | 2.97E-08 | 1.10E+03 | 2.72E-11 | 2 | 1.33E+02 | 3.00E+04 | 4.43E-03 | 2 |
| Footnote: NA = Not applicable because compound was not detected. | s not detected. | | | | | | | |

NA = Not applicable because compound was not detected.
na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

 $C_{chronic} = Chronic time-averaged concentration; HBSL = Chronic health-based screening level <math>C_{acute} = Acute concentration; ATV = Acute toxicity value$

Table D-14: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

| 100 meter location | | (SSMM pl | opelling c | Harge | 155mm propelling charge M3 (2one 3), M284 cannon | 1284 cannon | | |
|---------------------------------------|------------------------------|---|--------------------------------|------------|--|---|---|---------|
| | | As the most distributed and the whole it is | A Contract Contract | 00000:0540 | ; D540 | internation for solve the second section of | A commence of the commence of | |
| Compound (a) | С _{сһгопіс} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronle} / HBSL | > 1? | С _{асиtе} (µg/m³) | Acute Toxicity Value (µg/m³) | G _{acute} / ATV | > 1? |
| VOCs | | , | | | | | | |
| Dichlorodifluoromethane | ΑN | 2.09E+02 | | na | NA | 1.48E+07 | | na |
| Methyl Chloride | AN | 1.07E+00 | | na | NA | 2.06E+05 | | na |
| Dichlorotetrafluoroethane | Ν | N/ | | na | NA | AN | | na |
| Vinyi Chloride | ΑN | 2,20E-02 | • | na | NA | 1.28E+04 | | na |
| 1,3-Butadlene | NA | 3.74E-03 | | na | NA | 2.20E+04 | | na |
| Methyl Bromide | NA | 5.21E+00 | | na | NA | 5.82E+04 | | na |
| Ethyl Chloride | AN | 2.32E+00 | | na | NA | 7.92E+06 | | na |
| Trichlorofluoromethane | Å | 7.30E+02 | | na | AN | 2.81E+06 | | na |
| 1,1-Dichloroethene | 1.73E-03 | 5.21E+02 | 3.33E-06 | no | 1.94E+00 | 7.92E+04 | 2.45E-05 | on O |
| Dichloromethane | 6.69E-02 | 4.09E+00 | 1.64E-02 | no | 1.74E+02 | 6.96E+05 | 2.50E-04 | no |
| 3-Chloropropene | NA | 1.04E+00 | | na | NA | 9.39E+03 | | na |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | NA | 3.13E+04 | | na | NA | 9.58E+06 | | na |
| 1,1-Dichloroethane | NA | 5.21E+02 | | na | NA | 1.21E+06 | | na |
| cis-1,2-Dichloroethene | NA | 3.65E+01 | | na | NA | 7.92E+05 | | na |
| Trichloromethane | NA | 8.35E-02 | | na | NA | 9.76E+03 | | na |
| 1,2-Dichloroethane | AN | 7.39E-02 | | na | NA | 8.08E+03 | | na |
| 1,1,1-Trichloroethane | NA | 1.04E+03 | | na | NA | 1.94E+06 | | na |
| Benzene | 1.35E-02 | 2.49E-01 | 5.43E-02 | uo | 3.52E+01 | 1.56E+05 | 2.26E-04 | no |
| Carbon Tetrachloride | NA | 1.28E-01 | | na | NA | 1.28E+05 | | na |
| 1,2-Dichloropropane | NA | 9.89E-02 | | na | NA | 5.08E+05 | | na |
| Trichloroethene | NA | 1.12E+00 | | na | NA | 5.38E+05 | | na |
| cls-1,3-Dichloropropene | NA | 5.17E-02 | | na | NA NA | 1.14E+04 | | na |
| trans-1,3-Dichloropropene | NA | 5.17E-02 | | na | NA | NA | | na |
| 1,1,2-Trichloroethane | NA | 1.20E-01 | | na | NA | 1.64E+05 | | na |
| Toluene | 4.18E-04 | 4.02E+02 | 1.04E-06 | 00 | 4.67E-01 | 1.88E+05 | 2.49E-06 | ပ |
| 1,2-Dibromoethane | NA | 8.73E-03 | | na | NA | 1.54E+05 | | na |
| Tetrachloroethene | NA V | 3.31E+00 | | na | A A | 6.78E+05 | | na |
| Chlorobenzene | ΝΑ | 6.21E+01 | | na | NA | 1.38E+05 | | na |
| Ethylbenzene | NA | 1.06E+03 | | na | NA | 5.43E+05 | | na |
| m&p-Xylene | NA | 7.30E+02 | | na | NA NA | 6.51E+05 | | na |

Table D-14: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

| (を) (の) (の) (の) (の) (の) (の) (の) (の) (の) (の | | | | | | | | |
|--|------------------------------|----------------------------|------------|-----------------------------|---|----------------|-------------|------|
| | | lesmin pr | opelling c | harge M3 (zo DÓDIC: D540 | 155mm propelling charge M3 (zone 3), M284 cannon DÓDIC: D540 | //284 cannon | | |
| | • | Health-Based | C.tronto | | | Acute Toxicity | | |
| Compound (a) | C _{chronic} (µg/m²) | Screening Level (µg/m³) | HBSL | > 12 | C _{acute} (µg/m³) | Value (µg/m³) | Cacute/ ATV | × 1~ |
| | AN | 1.06E+03 | | na | ΑN | 2.13E+05 | | na |
| 1,1,2,2-Tetrachloroethane | NA | 3.31E-02 | | na | NA | 2.06E+04 | | na |
| o-Xylene | AN | 7.30E+02 | | na | AA | 6.51E+05 | | na |
| 4-Ethyitoluene | AN | NN | | na | NA | 1.25E+05 | | na |
| 1,3,5-Trimethylbenzene | NA | 6.21E+00 | • | na | NA | 3.68E+05 | | na |
| 1,2,4-Trimethylbenzene | NA | 6.21E+00 | | na | NA | 1.80E+05 | | na |
| Benzyl Chloride | NA | 3.96E-02 | | na | NA | 5.20E+03 | | na |
| m-Dichlorobenzene | NA | 3.29E+00 | | na | NA | 3.61E+04 | | na |
| p-Dichlorobenzene | NA | 3.06E-01 | | na | NA | 6.61E+05 | | na |
| o-Dichlorobenzene | NA | 2.09E+02 | | na | NA | 3.01E+05 | | na |
| 1,2,4-Trichlorobenzene | AN | 2.08E+02 | | na | NA | 3.71E+04 | | na |
| Hexachlorobutadlene | NA I | 8.62E-02 | | na | NA | 3.21E+04 | | na |
| Hydrocarbons | | | | | | | | |
| Methane | 4.32E-01 | N | | na | 1.93E+03 | 3.30E+06 | 5.85E-04 | ou |
| Ethane | NA | N | | na | NA | AN | | na |
| Ethylene | NA | NV | | na | NA | 4.60E+05 | | na |
| Propane | NA | N | | na | NA | 3.78E+06 | | na |
| Acetylene | NA | N | | na | NA | NA | | na |
| Isobutane | NA | N | | na | NA | 9.52E+05 | | na |
| n-Butane | NA | NV | | na | NA | 5.71E+06 | | na |
| Propylene | NA | N | | na | NA | AN | | na |
| | | | | | | | | |

Footnotes:

NA = Not applicable

na = Not available because health-based screening value is not available or not applicable because compound was not detected.

NV = No vatue

Cehronic = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

Sacute = Acute concentration

ः 4

ATV = Acute toxicity value

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Table D-15: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

| | | 155mm.p | ropelling | harge | 155mm propelling charge M3 (zone 3), M284 cannon | N284 cannon | | |
|-----------------------------|--------------------------------------|--|--------------------------------|-------|--|---------------------------------|-------------|-------------|
| | Source and the Administration of the | | | 2000 | ပမှင်ငံ ပခုနှပ | | | A 100 A 100 |
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronte} / HBSL | > 1? | С _{асиtе} (µg/m³) | Acute Toxicity Value (μg/m³) | Cacute/ ATV | > 12 |
| SVOCS | | | | | | | | |
| n-nitrosodimethylamine | NA | 1.37E-04 | | na | NA | 2.50E+03 | | na |
| bis(2-chloroethyl)ether | AN | 5.82E-03 | | na | NA | 5.85E+04 | | na |
| lonehd | 8.88E-04 | 2.19E+03 | 4.06E-07 | no | 3.97E+00 | 3.85E+04 | 1.03E-04 | no |
| 2-chlorophenol | NA | 1.83E+01 | | na | NA | 5.25E+03 | | na |
| 1,3-dichlorobenzene | ۷A | 3.29E+00 | | na | NA | 3.61E+04 | | na |
| 1,4-dichlorobenzene | AN | 3.06E-01 | | na | NA | 6.61E+05 | | na |
| 1,2-dichlorobenzene | ΑN | 2.09E+02 | | na | NA | 3.01E+05 | | na |
| benzyl alcohol | ΝA | 1.10E+03 | | na | NA | 5.53E+04 | | na |
| bis(2-chlorolsopropyl)ether | ۷N | 1.92E-01 | | na | NA | 6.99E+04 | | na |
| 2-methylphenol | ۷A | 1.83E+02 | | na | NA | NA | | na |
| hexachloroethane | ۷A | 4.80E-01 | | na | NA | 2.90E+04 | | na |
| n-nitroso-di-n-propylamine | ۷V | 9.61E-04 | | na | NA | 2.00E+02 | | na |
| 4-methylphenol | ۷A | 1.83E+02 | | na | NA | NA | | na |
| nitrobenzene | AN | 2.09E+00 | | na | NA | 1.51E+04 | | na |
| isophorone | AN | 7.08E+00 | | na | ΑN | 2.83E+04 | | na |
| 2-nitrophenol | AN | N | | na | -NA | NA | | na |
| 2,4-dimethylphenol | ۷A | 7.30E+01 | | na | NA | NA | | na |
| bis(2-chloroethoxy)methane | AN | NV | | na | NA | NA | | na · |
| 2,4-dichlorophenol | NA | 1.10E+01 | | na | ΝΑ | 3.00E+04 | | na |
| 1,2,4-trichiorobenzene | AN | 2.08E+02 | | na | ΑA | 3.71E+04 | | na |
| naphthalene | 2.40E-03 | 3.13E+00 | 7.68E-04 | ٤ | 1.07E+01 | 7.86E+04 | 1.36E-04 | 0 |
| 4-chloroaniline | NA | 1.46E+01 | | na | AN N | 3.00E+04 | | na |
| hexachlorobutadiene | ΑΝ | 8.62E-02 | | na | ۸A | 3.21E+04 | | na |
| 4-chloro-3-methylphenol | ΝΑ | N | | na | ΑΝ | 2.00E+04 | | na |
| 2-methylnaphthalene | NA | 7.30E+01 | | na | Ϋ́ | 2.00E+04 | | na |
| hexachlorocyclopentadiene | NA | 7.30E-02 | | na | ΝΑ | 2.23E+02 | | na |
| 2,4,6-trichiorophenol | NA | 1.10E+02 | | na | NA | ΑN | | na |
| 2,4,5-trichlorophenol | AA | 3.65E+02 | | na | NA NA | 3.00E+04 | | na |
| 2-chloronaphthalene | NA A | 2.92E+02 | | na | A A | 6.00E+02 | | na |
| 2-nitroanlline | NA | 2.09E-01 | | па | ΑΝ | NA | | Bu |
| dimethylphthalate | ΑΝ | 3.65E+04 | | na | ΝΑ | 1.50E+04 | | na |
| 2,6-dinitrotoluene | NA | 3.65E+00 | | na | ΝΑ | 6.00E+02 | | na |

Table D-15: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds 100 meter location

| | Gacute/ ATV > 1? | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | 2.01E-02 no | 60 |
|--|--|----------------|-------------------|--------------|--------------------|---------------|----------------------------|------------------|----------------|----------------------------|---------------------------|---------------------------|-------------------|-------------------|---------------------|----------------------|----------------------------|---------------------|
| 284 carinon | Acute Toxicity Cacu | 9.00E+03 | 7.50E+03 | NA | 6.00E+02 | 3.00E+04 | NA | 1.50E+04 | 9.00E+03 | 5.00E+02 | NA | NA | 7.50E+01 | 1.50E+03 | 1.50E+04 | 5.00E+05 | 1.00E+04 2.0 | 1.50E+05 |
| 155mm propelling.charge M3 (zone 3), M284 canhon | C _{acute} (µg/m³) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 2.01E+02 | ΨN |
| charge DODIC | > 1? | eu | eu | eu | ua | na | na | na | na | na | na | na | na | na | na | na | no | eu |
| ropelling | C _{chronic} / HBSL | | | | | | | | | | | | | | | | 4.03E-02 | |
| 165mm F | Health-Based Screening Level (µg/m³) | N. | 7.30E+00 | 1.46E+01 | 7.30E+00 | 2.92E+01 | NV | 2.92E+03 | NV | 3.65E-01 | 1.37E+00 | NV | 4.18E-03 | 5.60E-02 | 3.65E+02 | 7.30E+02 | 4.80E-01 | 7.30F+01 |
| | С _{сһгопіс} (µg/m³) | NA | NA | AN | NA | ΑN | NA | ΑN | NA | AN | AN | N A | AN | AN | ΝΑ | ΝΑ | 1.93E-02 | ΑN |
| | Compound | 3-nitroaniline | 2,4-dinitrophenol | dlbenzofuran | 2,4-dinitrotoluene | 4-nitrophenol | 4-chlorophenyl-phenylether | diethylphthalate | 4-nitroaniline | 4,6-dinitro-2-methylphenol | n-nitrosodiphenylamine(1) | 4-bromophenyl-phenylether | hexachlorobenzene | pentachlorophenol | di-n-butylphthalate | butylbenzylphthalate | bis(2-ethylhexyl)phthalate | di-n-octylobthalate |

Footnotes:

NA = Not applicable neath-based screening value is not available or not applicable because compound was not detected.

NV = No value

Cehronic = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

C_{acute} = Acute concentration ATV = Acute toxicity value

Table D-16: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aldehydes, and Acid Gases

| | | 1,55m | n propelling | charge DODIC | 155mm propelling charge M3 (zone 3), M284 cannon DODIC: D540 | #284 cannon | | |
|-------------------------------------|------------------------------|--|--------------------------------|-----------------|---|---------------------------------|--------------------------|----------|
| Compound | С _{сhronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 12 | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | C _{acute} / ATV | > 12 |
| PAHs | | | | | | | | |
| асепарhthylene | 3.86E-04 | NV | | na | 1.72E+00 | 2.00E+02 | 8.62E-03 | 2 |
| acenaphthene | 8.92E-05 | 2.19E+02 | 4.07E-07 | no | 3.98E-01 | 1.25E+03 | 3.19E-04 | 2 |
| fluorene | 1.37E-04 | 1.46E+02 | 9.42E-07 | no | 6.14E-01 | 7.50E+04 | 8.19E-06 | 2 |
| phenanthrene | 2.52E-04 | NN | | na | 1.12E+00 | 2.00E+03 | 5.62E-04 | on On |
| anthracene | 3.89E-05 | 1.10E+03 | 3.56E-08 | ou , | 1.74E-01 | 6.00E+03 | 2.90E-05 | ou |
| fluoranthene | 1.31E-04 | 1.46E+02 | 8.98E-07 | no | 5.86E-01 | 3.00E+01 | 1.95E-02 | ou |
| pyrene | 3.68E-04 | 1.10E+02 | 3.36E-06 | no | 1.64E+00 | 1.50E+04 | 1.10E-04 | 2 |
| benzo(a)anthracene | 1.11E-05 | 2.17E-02 | 5.12E-04 | no | 1.16E-01 | 6.00E+02 | 1.93E-04 | 2 |
| chrysene | 1.08E-05 | 2.17E+00 | 4.97E-06 | no | 1.12E-01 | 2.00E+02 | 5.61E-04 | 2 |
| benzo(b)fluoranthene | 2.41E-05 | 2.17E-02 | 1.11E-03 | no | 6.27E-02 | ΑN | | na |
| benzo(k)fluoranthene | 2.02E-05 | 2.17E-01 | 9.32E-05 | no | 5.27E-02 | ٩N | | na |
| benzo(a)pyrene | 3.88E-05 | 2.17E-03 | 1.79E-02 | no | 4.05E-01 | 7.50E+03 | 5.39E-05 | 2 |
| indeno(1,2,3-cd)pyrene | 6.03E-05 | 2.17E-02 | 2.78E-03 | no | 1.57E-01 | NA | | na |
| dibenz(a,h)anthracene | 1.49E-06 | 2.17E-03 | 6.88E-04 | no | 1.55E-02 | 3.00E+04 | 5.18E-07 | 2 |
| benzo(g,h,i)perylene | 3.34E-04 | N | | na | 1.49E+00 | 3.00E+04 | 4.97E-05 | 20 |
| Dioxins / Furans | | | | | | | | |
| 2378-Tetrachlorodibenzo-p-dioxin | 2.18E-10 | 4.48E-08 | 4.87E-03 | 0L | 2.27E-06 | 3.50E+00 | 6.49E-07 | 2 |
| 12378-Pentachlorodibenzo-p-dioxin | ¥. | N | | na | NA | 2.50E+00 | | na |
| 123478-Hexachlorodibenzo-p-dioxin | ΑN | Š | | na | NA | NA | | na |
| 123678-Hexachlorodibenzo-p-dioxin | 4.04E-10 | ≥ | | na | 1.81E-06 | 1.50E+01 | 1.20E-07 | 92 |
| 123789-Hexachlorodibenzo-p-dloxin | 6.98E-11 | 1.48E-06 | 4.72E-05 | n0 | 1.82E-07 | NA | | na |
| 1234678-Heptachlorodibenzo-p-dloxin | 3.68E-09 | 2 | | na | 4.10E-06 | NA | | na |
| Octachlorodibenzo-p-dioxin | 2.90E-08 | 2 | | na | 3.24E-05 | NA NA | | na |
| 2378-Tetrachlorodibenzo-p-furan | 3.28E-10 | 2 | | na | 1.47E-06 | 2.00E+00 | 7.33E-07 | no |
| 12378-Pentachlorodibenzo-p-furan | AN | Ž | | na | ΔA | NA | | na |
| 23478-Pentachlorodibenzo-o-furan | 1.53E-10 | ≥ | | па | 6.82E-07 | 7.50E-02 | 90-360.6 | uo |
| 123478-Hexachlorodibenzo-p-furan | 2.71E-10 | N< | | na | 1.21E-06 | 7.50E+00 | 1.61E-07 | 2 |
| 123789-Hexachlorodibenzo-p-furan | NA | ⋛ | | na | NA | NA | | na |
| 234678-Hexachlorodibenzo-p-furan | ΑN | N | | na | NA | 1.50E+00 | | na |
| 1234678-Heptachlorodibenzo-p-furan | 1.23E-09 | 2 | | na | 1.37E-06 | NA | | na |
| 1234789-Heptachlorodibenzo-p-furan | NA NA | N< | | na | NA | NA | | na |
| OCDF | 1.51E-09 | N | | na | 1.69E-06 | AN | | na |
| Aldehydes | | | | | | | | |
| Formaldehyde | AN | 1.48E-01 | 7 | na | NA | 1.23E+03 | | na |

1/16/01

Table D-16: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aldehydes, and Acid Gases 100 meter location

Footnote:

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

Cohonic = Chronic time-averaged concentration; HBSL = Chronic health-based screening level

Cacute = Acute concentration; ATV = Acute toxicity value

Table D-17: Comparison of Air Concentrations With Health-Based Values: Cyanides and Energetics

| | | 158mm | n prohalling | chardo | 155mm prohelling charge M3 (20ne 3) M984 cappon | 4284 cannon | | | |
|--|------------------------------|--|--------------------------------|--------|---|---------------------------------|-------------|------|--|
| | | | | DODIC | DODIC: D540 | | | | |
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | С _{асиіе} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 | |
| Particulate Cyanide and Hydrogen Cyanide (CN) | | • | | | | | | | |
| Particulate Cyanide | AN | 7.30E+01 | | na | ΑN | 5.00E+03 | | na | |
| Hydrogen Cyanide | 8.86E-01 | 3.13E+00 | 2.83E-01 | on | 3.96E+03 | 5.17E+03 | 7.65E-01 | 2 | |
| Energetics | | | | | | | | | |
| Nitrobenzene | NA | 2.09E+00 | - | na | NA | 1.51E+04 | | na | |
| 2-Nitrotoluene | NA | 3.65E+01 | | na | NA | NA | | na | |
| 3-Nitrotoluene | NA | 3.65E+01 | | na | NA | NA | | na | |
| 4-Nitrotoluene | AN | 3.65E+01 | | na | NA | 3.37E+04 | | na | |
| Nitroglycerine | NA | 4.80E-01 | | na | NA | NA | | na | |
| 1,3-Dinitrobenzene | NA | 3.65E-01 | | na | NA | 3.00E+03 | | na | |
| 2,6-Dinitrotoluene | NA | 3.65E+00 | | na | NA | 6.00E+02 | | na | |
| 2,4-Dinitrotoluene | NA | 7.30E+00 | | na | NA | 6.00E+02 | | na | |
| 1,3,5-Trinitrobenzene | NA | 1.10E+02 | | na | NA | 3.00E+04 | | na | |
| 2,4,6-Trinitrotoluene | NA | 2.24E-01 | | na | NA | 2.50E+04 | | na | |
| RDX | NA | 6.11E-02 | | na | NA | NA | | na | |
| 4-Amino-2,6-Dinitrotoluene | NA | NV | | | NA | NA | | | |
| 2-Amino-4,6-Dinitrotoluene | NA | N | | | NA | 1.50E+04 | | | |
| Tetryl | NA | 3.65E+01 | | na | NA | NA | | na | |
| HMX | NA | 1.83E+02 | | na | NA | NA | | na | |
| Pentaerythritoltetranitrate | NA | N | | na | NA | 5.00E+01 | | na | |
| Dibutyl phthalate | NA | 3.65E+02 | | na | NA | 1.50E+04 | | na | |
| Dioctyl phthalate | NA | 4.80E-01 | | na | NA | 1.00E+04 | | na | |
| Diphenylamine | NA | 9.13E+01 | | na | NA | 3.00E+04 | | na | |
| Footpote: | | | | | | | | | |

Footnote:

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

Contoute = Chronic time-averaged concentration; HBSL = Chronic health-based screening level

Cacule = Acute concentration; ATV = Acute toxicity value

Table D-18: Comparison of Air Concentrations With Health-Based Values: Total Petroleum Hydrocarbons 100 meter location

| | 155mm | 155mm propelling charge M3 (zone 3), M284 cannon DODIC: D540 | :harge M3 (zone 3), M28 [,] DØDIG: D540 | 4 cannon |
|--------------------------------------|------------------------------|---|---|------------------------------|
| Compound (a) | C _{chronic} (µg/m³) | C _{chronic} (µg/m³) | С _{сhronic} (µg/m³) | С _{сhronic} (µg/m³) |
| | Aliphatic:C<≖8 | Allphatic:C>8 | Aromatic:C<=8 | Aromatic:C>8 |
| Benzene | AN | NA | 3.16E-02 | AN |
| Toluene | NA | AN | 4.18E-04 | AN |
| naphthalene | NA | · NA | NA | 2.40E-03 |
| acenaphthylene | NA | NA | NA | 3.86E-04 |
| acenaphthene | ΥN | NA | NA | 8.92E-05 |
| fluorene | AN | NA | NA | 1.37E-04 |
| phenanthrene | NA | NA | NA | 2.52E-04 |
| anthracene | NA | NA | NA | 3.89E-05 |
| Total (µg/m³) | 0.00E+00 | 0.00E+00 | 3.20E-02 | 3.30E-03 |
| Derived Health-Based Screening Level | 1.92E+04 | 1.04E+03 | 4.17E+02 | 2.09E+02 |
| C _{chronic} /HBSL | 0.00E+00 | 0.00E+00 | 7.66E-05 | 1.58E-05 |
| >19 | no | no | no | ou |
| ootnotes: | | | | |

-ootnotes:

>1? = Is the ratio greater than one?

NA = Not Applicable because compound was not detected

C_{chronlc} = chronic averaged air Concentration (not adjusted for cancer averaging time of 70 years)

HBSL = Health-Based Screening Level

RISK EVALUATION DATA FOR CHARGE M3, FIRED FROM THE M284 CANNON, ZONE 3, 200 METERS DOWNWIND

Table D-19: Comparison of Air Concentrations With Health-Based Values: Gases, Particulates and Metals 200 meter location

| ZOU METER FOCATION | | | | | | | | |
|-----------------------------------|------------------------------|--|--------------------------------|-------------------|---|---------------------------------|--------------------------|------|
| | | 155mn | n propelling | j charge DODIC | 155mm propelling charge M3 (zone 3), M284 cannon DODIC: D540 | //284 cannon | | |
| Compound | С _{сьгопіс} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | С _{асиtе} (µg/m³) | Acute Toxicity Value (µg/m³) | C _{acute} / ATV | > 12 |
| Gases | | | | | | | | |
| NH ₃ | 8.85E-01 | 1.04E+02 | 8.49E-03 | ou | 9.88E+02 | 1.75E+04 | 5.65E-02 | no |
| Carbon Dioxide (CO ₂) | 1.52E+01 | N | | na | 6.78E+04 | 5.40E+07 | 1.25E-03 | ရ |
| Carbon Monoxide (CO) | 3.93E+01 | 1.57E+02 | 2.50E-01 | no | 4.39E+04 | 2.30E+05 | 1.91E-01 | ou |
| Nitrogen Oxides (as NO) | 3.17E-01 | 1.00E+02 | 3.17E-03 | no | 1.41E+03 | 2.70E+05 | 5.24E-03 | no |
| Methane (CH ₄) | AN | N\ | | na | ΑN | 3.30E+06 | | na |
| Sulfur Dloxide (SO ₂) | NA | 8.00E+01 | | na | ĄN | 7.89E+02 | | na |
| Combined Particulate | | | | | | | | |
| TSP | 1.17E+00 | 5.00E+01 | 2.33E-02 | no | 1.30E+03 | NA | | na |
| PM ₁₀ | 1.00E+00 | 5.00E+01 | 2.00E-02 | ou | 1.12E+03 | AN | | na |
| PM _{2.5} | 5.36E-01 | 1.50E+01 | 3.57E-02 | OU | 5.98E+02 | NA | | na |
| Metals | | | | | | | | |
| Antimony | NA | 1.46E+00 | | na | NA | 1.50E+03 | | na |
| Arsenic | 3.12E-05 | 4.47E-04 | 6.98E-02 | ou | 3.25E-01 | 3.00E+01 | 1.08 E -02 | 00 |
| Barlum | 7.27E-04 | 5.21E-01 | 1.39E-03 | ou | 3.25E+00 | 1.50E+03 | 2.16E-03 | no |
| Beryllium | NA | 8.00E-04 | | eu | NA | 5.00E+00 | | na |
| Cadmium | NA | 1.07E-03 | | na | ΝΑ | 3.00E+01 | | na |
| Chromium | 5.49E-05 | 1.53E-04 | 3.60E-01 | ou | 5.73E-01 | 1.50E+03 | 3.82E-04 | no |
| Cobalt | 2.16E-05 | 2.20E+02 | 9.84E-08 | no | 9.67E-02 | 6.00E+01 | 1.61E-03 | no |
| Copper | 6.76E-02 | 1.46E+02 | 4.63E-04 | no | 3.02E+02 | 3.00E+03 | 1.01E-01 | no |
| Lead | 6.20E-03 | 1.50E+00 | 4.14E-03 | ou | 2.77E+01 | 1.50E+02 | 1.85E-01 | no |
| Manganese | 5.12E-04 | 5.11E-02 | 1.00E-02 | no | 2.29E+00 | 3.00E+03 | 7.63E-04 | no |
| Nickel | 2.23E-10 | 7.30E+01 | 3.05E-12 | no | 9.94E-01 | 3.00E+03 | 3.31E-04 | no |
| Selenium | NA | 1.83E+01 | | ηa | NA | 6.00E+02 | | na |
| Silver | NA | 1.83E+01 | | na | NA | 3.00E+02 | | na |
| Thallium | NA | 2.56E-01 | | na | NA | 3.00E+02 | | na |
| Zinc | 1.18E-08 | 1.10E+03 | 1.08E-11 | 00 | 5.29E+01 | 3.00E+04 | 1.76E-03 | no |
| | | | | | | | | |

Footnote:

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

C_{chronic} = Chronic time-averaged concentration; HBSL = Chronic health-based screening level

Cacute = Acute concentration; ATV = Acute toxicity value

Table D-20: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds 200 meter location

| AVV MIRTER IDCANON | | | | | | | | |
|---------------------------------------|------------------------------|--|--------------------------------|----------------|---|---------------------------------|--------------------------|------|
| | | 155mm pi | opelling c | harge DODIC | 155mm propélling charge M3 (zone 3), M284 cannon DØDIC: D540 | #284 cannon | | |
| Compound (a) | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | С _{асиtе} (µg/m³) | Acute Toxicity Value (µg/m³) | C _{acute} / ATV | > 1? |
| VOCs | | | | | | | | |
| Dichlorodifluoromethane | AN | 2.09E+02 | | na | AN | 1.48E+07 | | na |
| Methyl Chloride | NA | 1.07E+00 | | na | NA | 2.06E+05 | | na |
| Dichlorotetrafluoroethane | ΑN | N. | | na | NA | AA | | na |
| Vinyl Chloride | AN | 2.20E-02 | • | na | AN | 1.28E+04 | | na |
| 1,3-Butadiene | NA | 3.74E-03 | | na | NA | 2.20E+04 | | na |
| Methyl Bromide | NA | 5.21E+00 | | na | NA | 5.82E+04 | | na |
| Ethyl Chloride | ΑN | 2.32E+00 | | na | AN | 7.92E+06 | | na |
| Trichlorofluoromethane | AN | 7.30E+02 | | na | AN | 2.81E+06 | | na |
| 1,1-Dichloroethene | 6.91E-04 | 5.21E+02 | 1.32E-06 | no | 7.71E-01 | 7.92E+04 | 9.74E-06 | 2 |
| Dichloromethane | 2.66E-02 | 4.09E+00 | 6.52E-03 | uo | 6.94E+01 | 6.96E+05 | 9.97E-05 | 2 |
| 3-Chloropropene | NA | 1.04E+00 | | na | NA | 9.39E+03 | | na |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | NA | 3.13E+04 | | na | NA | 9.58E+06 | | na |
| 1,1-Dichtoroethane | NA | 5.21E+02 | | na | NA | 1.21E+06 | | na |
| cls-1,2-Dichloroethene | NA | 3.65E+01 | | na | NA | 7.92E+05 | | па |
| Trichloromethane | NA | 8.35E-02 | | na | NA | 9.76E+03 | | na |
| 1,2-Dichloroethane | NA | 7.39E-02 | | na | NA | 8.08E+03 | | na |
| 1,1,1-Trichloroethane | NA | 1.04E+03 | | na | NA | 1.94E+06 | | na |
| Вепзепе | 5.38E-03 | 2.49E-01 | 2.16E-02 | no | 1.40E+01 | 1.56E+05 | 8.99E-05 | ou |
| Carbon Tetrachloride | NA | 1.28E-01 | | na | NA | 1.28E+05 | | na |
| 1,2-Dichloropropane | NA | 9.89E-02 | | na | NA | 5.08E+05 | | na |
| Trichloroethene | NA | 1.12E+00 | | na | NA | 5.38E+05 | | na |
| cls-1,3-Dichloropropene | NA | 5.17E-02 | | na | NA | 1.14E+04 | | na |
| trans-1,3-Dichloropropene | NA NA | 5.17E-02 | | na | NA | WA | | na |
| 1,1,2-Trichloroethane | NA | 1.20E-01 | | na | NA | 1.64E+05 | | na |
| Тоlиепе | 1.67E-04 | 4.02E+02 | 4.15E-07 | no | 1.86E-01 | 1.88E+05 | 9.91E-07 | ou |
| 1,2-Dibromoethane | NA | 8.73E-03 | | na | NA | 1.54E+05 | | na |
| Tetrachloroethene | NA | 3.31E+00 | | na | NA | 6.78E+05 | | na |
| Chlorobenzene | NA | 6.21E+01 | | na | NA | 1.38E+05 | | na |
| Ethylbenzene | N A | 1.06E+03 | | na | Ϋ́ | 5.43E+05 | | na |
| m&p-Xylene | NA | 7.30E+02 | | na | NA V | 6.51E+05 | | na |
| | | | | | | | | |

Table D-20; Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

| | | 155mm pr | o Guilledo, | harge M3 (zo DODIC: D540 | 155mm propelling charge M3 (zone 3), M284 cannon DODIC: D540 | 1284 cannon | | |
|---------------------------|------------------------------|--|--------------------------------|-----------------------------|---|---------------------------------|-------------|------|
| Compound (a) | С _{сhronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronlc} / HBSL | > 12 | С _{асиtе} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| Styrene | AN | 1.06E+03 | | na | NA | 2.13E+05 | | na |
| 1,1,2,2-Tetrachloroethane | ΑN | 3.31E-02 | | na | AN | 2.06E+04 | | na |
| o-Xylene | NA | 7.30E+02 | | na | NA | 6.51E+05 | | na |
| 4-Ethyltoluene | NA | N | | na | NA | 1.25E+05 | | na |
| 1,3,5-Trimethylbenzene | NA | 6.21E+00 | • | na | NA | 3.68E+05 | | na |
| 1,2,4-Trimethylbenzene | NA | 6.21E+00 | | na | NA | 1.80E+05 | | na |
| Benzyl Chloride | NA | 3.96E-02 | | na | NA | 5.20E+03 | | na |
| m-Dichlorobenzene | NA | 3.29E+00 | | na | NA | 3.61E+04 | | na |
| p-Dichlorobenzene | NA | 3.06E-01 | | na | NA | 6.61E+05 | | na |
| o-Dichlorobenzene | NA | 2.09E+02 | | na | NA | 3.01E+05 | | na |
| 1,2,4-Trichlorobenzene | NA | 2.08E+02 | | na | NA | 3.71E+04 | | na |
| Hexachlorobutadiene | NA | 8.62E-02 | | na | NA | 3.21E+04 | | na |
| Hydrocarbons | | | | | | | | |
| Methane | 1.72E-01 | NN | | na | 7.69E+02 | 3.30E+06 | 2.33E-04 | OU |
| Ethane | NA | NN | | na | NA | NA | | na |
| Ethylene | AN | N | | na | NA | 4.60E+05 | | na |
| Propane | NA | NV | | na | NA | 3.78E+06 | | na |
| Acetylene | NA | NV | | na | NA | NA | | na |
| Isobutane | NA | N | | na | NA | 9.52E+05 | | na |
| n-Butane | NA | >≥ | | na | NA | 5.71E+06 | | na |
| Propylene | NA | N | | na | NA | NA | | na |

Footnotes:

NA = Not applicable

na = Not available because health-based screening value is not available or not applicable because compound was not detected.

NV = No vatue

C_{chronic} = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

Cacute = Acute concentration

ATV = Acute toxicity value

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Table D-21: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

| | | 155mm p | ropelling | charge | 155mm propelling charge M3 (zone 3), M284 cannon DODIC: D540 | M284 cannon | | |
|-----------------------------|------------------------------|--|--------------------------------|--------|---|---------------------------------|-------------|------|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 12 | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | × 12 |
| SVOCs | | | | | | | | |
| n-nitrosodimethylamine | ΑN | 1.37E-04 | | БП | NA | 2.50E+03 | | na |
| bis(2-chloroethyl)ether | NA | 5.82E-03 | | na | ΑN | 5,85E+04 | | na |
| loueld | 3.54E-04 | 2.19E+03 | 1.61E-07 | on | 1.58E+00 | 3.85E+04 | 4.10E-05 | 2 |
| 2-chlorophenol | ΑN | 1.83E+01 | | na | ΑN | 5.25E+03 | | na |
| 1,3-dichlorobenzene | ΑN | 3.29E+00 | | na | ΑN | 3.61E+04 | | na |
| 1,4-dichlorobenzene | NA | 3.06E-01 | | na | NA | 6.61E+05 | | na |
| 1,2-dichlorobenzene | NA | 2.09E+02 | | na | NA | 3.01E+05 | | na |
| benzyl alcohol | ۷N | 1.10E+03 | | na | NA | 5.53E+04 | | na |
| bis(2-chloroisopropyi)ether | ۷N | 1.92E-01 | | na | NA | 6.99E+04 | | na |
| 2-methylphenol | ۷N | 1.83E+02 | | na | AN | ΑN | | na |
| hexachloroethane | AN | 4.80E-01 | | na | NA | 2.90E+04 | | na |
| n-nitroso-di-n-propylamine | ۷N | 9.61E-04 | | na | NA | 2.00E+02 | | na |
| 4-methylphenol | ۷N | 1.83E+02 | | na | NA | AN | | na |
| nitrobenzene | ۷N | 2.09E+00 | | na | NA | 1.51E+04 | | na |
| Isophorone | ۷N | 7.08E+00 | | na | NA | 2.83E+04 | | na |
| 2-nitrophenol | NA | N< | | na | NA | NA | | na |
| 2,4-dimethylphenol | NA | 7.30E+01 | | na | NA | NA | | na |
| bls(2-chloroethoxy)methane | ۷N | NV | | na | NA | NA | | na |
| 2,4-dichlorophenol | NA | 1.10E+01 | | na | NA | 3.00E+04 | | na |
| 1,2,4-trichlorobenzene | NA | 2.08E+02 | | na | ΝΑ | 3.71E+04 | | na |
| naphthalene | 9.56E-04 | 3.13E+00 | 3.06E-04 | no | 4.27E+00 | 7.86E+04 | 5.43E-05 | no |
| 4-chloroaniline | NA | 1.46E+01 | | na | NA | 3.00E+04 | | na |
| hexachlorobutadiene | NA | 8.62E-02 | | na | NA | 3.21E+04 | | na |
| 4-chloro-3-methylphenol | NA | NV | | na | NA | 2.00E+04 | | na |
| 2-methylnaphthalene | NA | 7.30E+01 | | na | NA | 2.00E+04 | | na |
| hexachlorocyclopentadlene | AN | 7.30E-02 | | na | NA | 2.23E+02 | | na |
| 2,4,6-trichiorophenol | ΝΑ | 1.10E+02 | | na | NA | NA | | na |
| 2,4,5-trichlorophenol | ΑΝ | 3.65E+02 | | na | NA | 3.00E+04 | | na |
| 2-chloronaphthalene | NA | 2.92E+02 | | na | NA | 6.00E+02 | | na |
| 2-nitroaniline | NA | 2.09E-01 | | na | NA | NA | | na |
| dimethylphthalate | NA | 3.65E+04 | | na | NA | 1.50E+04 | | na |
| 2,6-dinitrotoluene | ΑN | 3.65E+00 | | na | NA | 6.00E+02 | | na |

Table D-21: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

| | | 155mm p | ropelling | harge Döbic | 155mm propelling charge M3 (zone 3), M284 cannon D@DIC: D540 | /284 cannon | | |
|----------------------------|------------------------------|--|--------------------------------|----------------|---|---------------------------------|--------------------------|------|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | G _{acute} / ATV | > 1? |
| 3-nltroanlline | AN | 2 | | na | NA | 9.00E+03 | | na |
| 2,4-dinitrophenol | NA | 7.30E+00 | | na | NA | 7.50E+03 | | na |
| dlbenzofuran | NA A | 1.46E+01 | | na | NA | NA | ٠ | na |
| 2,4-dinifrotoluene | NA | 7.30E+00 | | na | NA | 6.00E+02 | | na |
| 4-nitrophenol | ΑN | 2.92E+01 | | na | NA | 3.00E+04 | | na |
| 4-chlorophenyl-phenylether | ΝA | ΛN | | na | NA | NA | | na |
| diethylphthalate | NA | 2.92E+03 | | na | NA | 1.50E+04 | | na |
| 4-nitroaniline | ΑN | NV | | na | NA | 9.00E+03 | | na |
| 4,6-dinitro-2-methylphenol | AN | 3.65E-01 | | na | NA | 5.00E+02 | | na |
| n-nltrosodiphenylamine(1) | NA | 1.37E+00 | | na | NA | NA | | na |
| 4-bromophenyl-phenylether | AN | N | | na | NA | NA | | na |
| hexachlorobenzene | AN | 4.18E-03 | | na | NA | 7.50E+01 | | na |
| pentachlorophenol | AN | 5.60E-02 | | na | NA | 1.50E+03 | | na |
| di-n-butyiphthalate | AN | 3.65E+02 | | na | NA | 1.50E+04 | | na |
| butylbenzylphthalate | AN | 7.30E+02 | | na | ۸A | 5.00E+05 | | na |
| bis(2-ethylhexyl)phthalate | 7.70E-03 | 4.80E-01 | 1.60E-02 | no | 8.02E+01 | 1.00E+04 | 8.02E-03 | no |
| di-n-octylphthalate | NA | 7.30E+01 | | па | NA | 1.50E+05 | | na |

Footnotes:

NA = Not applicable

na = Not available because health-based screening value is not available or not applicable because compound was not detected. NV = No value

C_{chronic} = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

Cacute = Acute concentration

Table D-22: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aldehydes, and Acid Gases

| | | 155mr | 155mm propelling | charge DODIC | charge M3 (zone 3), M284 cannon DODIG: D540 | W284 cannon | | |
|-------------------------------------|------------------------------|--|------------------------|-----------------|--|---------------------------------|-------------|----------|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chrontc} / | > 1? | С _{асиіе} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| PAHS | | | | | | | | |
| acenaphthylene | 1.54E-04 | N/ | | na | 6.87E-01 | 2.00E+02 | 3.43E-03 | no |
| acenaphthene | 3.55E-05 | 2.19E+02 | 1.62E-07 | no | 1.59E-01 | 1.25E+03 | 1.27E-04 | 2 |
| fluorene | 5.47E-05 | 1.46E+02 | 3.75E-07 | no | 2.44E-01 | 7.50E+04 | 3.26E-06 | OL OL |
| phenanthrene | 1.00E-04 | N | | na | 4.47E-01 | 2.00E+03 | 2.24E-04 | no |
| anthracene | 1.55E-05 | 1.10E+03 | 1.42E-08 | , no | 6.92E-02 | 6.00E+03 | 1.15E-05 | no |
| fluoranthene | 5.22E-05 | 1.46E+02 | 3.58E-07 | no | 2.33E-01 | 3.00E+01 | 7.77E-03 | no |
| pyrene | 1.47E-04 | 1.10E+02 | 1.34E-06 | no | 6.55E-01 | 1.50E+04 | 4.37E-05 | no |
| benzo(a)anthracene | 4.42E-06 | 2.17E-02 | 2.04E-04 | no | 4.60E-02 | 6.00E+02 | 7.67E-05 | no O |
| chrysene | 4.29E-06 | 2.17E+00 | 1.98E-06 | no | 4.47E-02 | 2.00E+02 | 2.23E-04 | on O |
| benzo(b)fluoranthene | 9.58E-06 | 2.17E-02 | 4.42E-04 | no | 2.50E-02 | NA | | na |
| benzo(k)fluoranthene | 8.05E-06 | 2.17E-01 | 3.71E-05 | no | 2.10E-02 | NA | | na |
| benzo(a)pyrene | 1.55E-05 | 2.17E-03 | 7.13E-03 | no | 1.61E-01 | 7.50E+03 | 2.15E-05 | D D |
| Indeno(1,2,3-cd)pyrene | 2.40E-05 | 2.17E-02 | 1.11E-03 | no | 6.25E-02 | NA | | na |
| dibenz(a,h)anthracene | 5.94E-07 | 2.17E-03 | 2.74E-04 | no | 6.19E-03 | 3.00E+04 | 2.06E-07 | no |
| benzo(g,h,l)perylene | 1.33E-04 | NV | | na | 5.93E-01 | 3.00E+04 | 1.98E-05 | no |
| Dioxins / Furans | | | | | | | | |
| 2378-Tetrachlorodibenzo-p-dloxin | 8.68E-11 | 4.48E-08 | 1.94E-03 | оп 0 | 9.05E-07 | 3.50E+00 | 2.59E-07 | no |
| 12378-Pentachlorodibenzo-p-dloxin | NA | NV | | na | NA | 2.50E+00 | | na |
| 123478-Hexachlorodibenzo-p-dloxin | AN | NV | | na | Ϋ́ | NA | | na |
| 123678-Hexachlorodibenzo-p-dioxin | 1.61E-10 | NV | | na | 7.19E-07 | 1.50E+01 | 4.79E-08 | no |
| 123789-Hexachlorodibenzo-p-dioxin | 2.78E-11 | 1.48E-06 | 1.88E-05 | OL. | 7.24E-08 | NA | | na |
| 1234678-Heptachlorodibenzo-p-dioxin | 1.46E-09 | 2 | | na | 1.63E-06 | NA NA | | na |
| Octachlorodibenzo-p-dioxin | 1.15E-08 | ≥ | | Бā | 1.29E-05 | NA | | na |
| 2378-Tetrachlorodibenzo-p-furan | 1,31E-10 | ≥ | | gu | 5.83E-07 | 2.00E+00 | 2.92E-07 | 0U |
| 12378-Pentachlorodibenzo-p-furan | NA | N | | па | ΑΝ | NA | | na |
| 23478-Pentachlorodibenzo-o-furan | 6.08E-11 | NV | | na | 2.71E-07 | 7.50E-02 | 3.62E-06 | 00 |
| 123478-Hexachlorodibenzo-p-furan | 1.08E-10 | N | | na | 4.82E-07 | 7,50E+00 | 6.43E-08 | no |
| 123789-Hexachlorodibenzo-p-furan | NA | NV | | na | NA | NA | | na |
| 234678-Hexachlorodibenzo-p-furan | NA | N | | g | NA A | 1.50E+00 | | na |
| 1234678-Heptachlorodibenzo-p-furan | 4.90E-10 | N/ | | па | 5.47E-07 | NA | | na |
| 1234789-Heptachlorodibenzo-p-furan | NA ' | N | | na | NA A | AA | | na |
| OCDF | 6.01E-10 | NΛ | | na | 6.71E-07 | NA | | na |
| Aldehydes | | | | | | | | |
| Formaldehyde | NA | 1.48E-01 | | na | NA | 1.23E+03 | | na |
| | | | | | | | | |

1/16/01

Table D-22: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aldehydes, and Acid Gases

| | | 155mm | n propelling | reharge Dobic | 155mm propelling charge M3 (zone 3), M284 cannon bobic: D540 | W284 canhon | | |
|--------------------------|--------------------------------|--|--------------------------------|------------------|---|---------------------------------|-------------|------|
| Compound | . С _{сhronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | С _{асиіе} (µg/m³) | Acute Toxicity Value (μg/m³) | Cacute/ ATV | > 1? |
| Acetaldehyde | AN | 8.73E-01 | | na | ΑN | 1.80E+04 | | na |
| Acetone | ΝΑ | 3.65E+02 | | na | NA | 2.37E+06 | | na |
| Acrolein | NA | 2.09E-02 | | na | NA | 2.30E+02 | | na |
| Proprionaldehyde | AN | N N | | na | NA | 7.50E+04 | | ua |
| Crotonaldehyde | AN | 3.54E-03 | | na | NA | 5.72E+03 | | na |
| Butyraldehyde | NA | ΛN | | , na | NA | 7.38E+04 | | na |
| Benzaldehyde | NA | 3.65E+02 | | na | NA | 1.50E+04 | | na |
| Isovaleraldehyde | NA | NV | | na | NA | NA | | na |
| Valeraldehyde | NA | NN | | na | NA | ۷A | | na |
| o,m,p-Tolualdehyde | NA | NV | | na | NA | NA | | na |
| Hexaldehyde | NA | NN | | na | NA | ۷N | | na |
| 2,5-Dimethylbenzaldehyde | NA | N | | na | NA | AN | | na |
| Acid Gases | | | | | | | | |
| Hydrogen fluoride | NA | N N | | na | NA | 1.60E+03 | | eu |
| Hydrogen chloride | NA | 2.08E+01 | | na | NA | 4.50E+03 | | eu |
| Hydrogen bromide | NA | N | | na | NA | 6.93E+03 | | eu |
| Nitric Acid | AN | N/ | | na | NA | 5.16E+03 | | ua |
| Phosphoric acid | NA | 1.04E+01 | | na | NA | 3.00E+03 | | na |
| Sulfuric Acid | 5.62E-02 | NV | | na | 6.27E+01 | 2.00E+03 | 3.14E-02 | ou |
| | | | | | | | | |

Footnote:

NA = Not applicable because compound was not detected.

na = Not.available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value $G_{\rm chronic}$ = Chronic time-averaged concentration ; HBSL = Chronic health-based screening level $G_{\rm scute}$ = Acute concentration; ATV = Acute toxicity value

Table D-23: Comparison of Air Concentrations With Health-Based Values: Cyanides and Energetics

| 200 meter location | | | | • | | | | |
|--|------------------------------|--|--------------------------------|-----------------|---|---------------------------------|--------------------------|------|
| | | 155mr | n propelling | charge DODIC | 155mm propelling charge M3 (zone 3), M284 cannon DODIC: D540 | 1284 cannon | | |
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | С _{асиtе} (µg/m³) | Acute Toxicity Value (µg/m³) | C _{acute} / ATV | > 1? |
| Particulate Cyanide and Hydrogen Cyanide (CN) | | | | | | | | |
| Particulate Cyanide | NA | 7.30E+01 | | na | NA | 5.00E+03 | | na |
| Hydrogen Cyanide | 3.53E-01 | 3.13E+00 | 1.13E-01 | 110 | 1.58E+03 | 5.17E+03 | 3.05E-01 | ou |
| Energetics | | | | | | | | |
| Nitrobenzene | NA | 2.09E+00 | | na | NA | 1.51E+04 | | na |
| 2-Nitrotoluene | ΝA | 3.65E+01 | | na | NA | NA | | na |
| 3-Nitrotoluene | ΝΑ | 3.65E+01 | | na | NA | NA | | na |
| 4-Nitrotoluene | ΑN | 3.65E+01 | | na | NA | 3.37E+04 | | na |
| Nitroglycerine | AN | 4.80E-01 | | na | NA | NA | | na |
| 1,3-Dinitrobenzene | NA | 3.65E-01 | | na | NA | 3.00E+03 | | na |
| 2,6-Dinitrotoluene | NA | 3.65E+00 | | na | NA | 6.00E+02 | | na |
| 2,4-Dinitrotoluene | NA | 7.30E+00 | | na | NA | 6.00E+02 | | na |
| 1,3,5-Trinitrobenzene | NA | 1.10E+02 | | na | NA | 3,00E+04 | | na |
| 2,4,6-Trinitrotoluene | NA | 2.24E-01 | | na | NA | 2.50E+04 | | na |
| RDX | NA | 6.11E-02 | | na | NA | NA | | na |
| 4-Amino-2,6-Dinitrotoluene | NA | NV | | | NA | NA | | |
| 2-Amino-4,6-Dinitrotoluene | NA | NV | | | NA | 1.50E+04 | | |
| Tetryl | NA | 3.65E+01 | | na | NA | ΑΝ | | na |
| HMX | AN | 1.83E+02 | | na | NA | NA | | na |
| Pentaerythritoltetranitrate | NA | NV | | na | ΝΑ | 5.00E+01 | | na |
| Dibutyl phthalate | ΝΑ | 3.65E+02 | | na | NA | 1.50E+04 | | na |
| Dioctyl phthalate | NA | 4.80E-01 | | eu | AN | 1.00E+04 | | na |
| | | , 0 | | | 414 | 10000 | | |

NA = Not applicable because compound was not detected.

Footnote:

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

na

3.00E+04

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Pentaerythritoltetranitrate Dibutyl phthalate Dioctyl phthalate Diphenylamine

9.13E+01

NV = No value

Centonic = Chronic time-averaged concentration; HBSL = Chronic health-based screening level

Cacuta = Acute concentration; ATV = Acute toxicity value

Table D-24: Comparison of Air Concentrations With Health-Based Values: Total Petroleum Hydrocarbons 200 meter location

| | 155mm | propelling charge DODIC | 155mm propelling charge M3 (zone 3), M284 cannon DODIC: D540 | 4 cannon |
|--------------------------------------|------------------------------|------------------------------|---|------------------------------|
| Compound (a) | C _{chronic} (µg/m³) | C _{chronic} (µg/m³) | С _{сһгопіс} (µg/m³) | C _{chronic} (µg/m³) |
| | Allphatic:C<=8 | Allphatic:C>8 | Aromatic: C<=8 | Aromatic:C>8 |
| Benzene | NA | NA | 1.26E-02 | NA |
| Toluene | NA | NA | 1.67E-04 | NA |
| naphthalene | NA | ٠NA | NA | 9.56E-04 |
| acenaphthylene | NA | NA | NA | 1.54E-04 |
| асепарhthепе | AN | NA | AN | 3.55E-05 |
| fluorene | WA | AN | NA | 5.47E-05 |
| phenanthrene | NA | NA | NA | 1.00E-04 |
| anthracene | NA | NA | NA | 1.55E-05 |
| Total (µg/m³) | 0.00E+00 | 0.00E+00 | 1.27E-02 | 1.32E-03 |
| Derived Health-Based Screening Level | 1.92E+04 | 1.04E+03 | 4.17E+02 | 2.09E+02 |
| C _{chronlc} /HBSL | 0.00E+00 | 0.00E+00 | 3.05E-05 | 6.31E-06 |
| >1? | no | no | no | no |
| -ootnotes: | | | | |

>1? = Is the ratio greater than one?

NA = Not Applicable because compound was not detected

C_{chronic} = chronic averaged air Concentration (not adjusted for cancer averaging time of 70 years)

HBSL = Health-Based Screening Level

RISK EVALUATION DATA FOR CHARGE M3, FIRED FROM THE M199 CANNON, ZONE 5, 100 METERS DOWNWIND

Table D-25: Comparison of Air Concentrations With Health-Based Values: Gases, Particulates and Metals

| | | 155mm | Dundoud | charge | 155mm propelling charge M3 (zone 5), M199 cannon การการกรุก | W199 cannon | | |
|-----------------------------------|------------------------------|--|-------------------|--------|--|---------------------------------|--------------------------|---------|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | Cehronic/ HBSL | > 13 | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | C _{acute} / ATV | >12 |
| Gases | | | | | | | | |
| NH3 | 4.47E+00 | 1.04E+02 | 4.29E-02 | uo | 4.99E+03 | 1.75E+04 | 2.85E-01 | ou |
| Carbon Dioxide (CO ₂) | 5.75E+01 | Š | | na | 2.57E+05 | 5.40E+07 | 4.75E-03 | on O |
| Carbon Monoxide (CO) | 1,51E+02 | 1.57E+02 | 9.63E-01 | по | 1.69E+05 | 2.30E+05 | 7.34E-01 | no |
| Nitrogen Oxides (as NO) | 2.09E+00 | 1.00E+02 | 2.09E-02 | no | 9.35E+03 | 2.70E+05 | 3.46E-02 | no |
| Methane (CH ₄) | ΨV | N/ | | na | NA | 3.30E+06 | | na |
| Sulfur Dioxide (SO ₂) | ΑΝ | 8.00E+01 | | eu | NA | 7.89E+02 | | na |
| Combined Particulate | | | | | | | | |
| TSP | 6.25E+00 | 5.00E+01 | 1.25E-01 | ou | 6.98E+03 | AN | | na |
| PM ₁₀ | 4.47E+00 | 5.00E+01 | 8.93E-02 | ou | 4.99E+03 | NA | | na |
| PM _{2.5} | 1.77E+00 | 1.50E+01 | 1.18E-01 | ou | 1.97E+03 | NA | | na |
| Metals | | | | | | | | |
| Antimony | 1.55E-10 | 1.46E+00 | 1.06E-10 | ou | 6.94E-01 | 1.50E+03 | 4.63E-04 | no |
| Arsenic | 1.48E-04 | 4.47E-04 | 3.30E-01 | ou | 1.54E+00 | 3.00E+01 | 5.13E-02 | no |
| Barlum | 3.38E-03 | 5.21E-01 | 6.49E-03 | ou | 1.51E+01 | 1.50E+03 | 1.01E-02 | no |
| Berylllum | NA | 8.00E-04 | | na | NA | 5.00E+00 | | na |
| Cadmlum | 5.05E-05 | 1.07E-03 | 4.73E-02 | ou | 5.26E-01 | 3.00E+01 | 1.75E-02 | no |
| Chromium | 3.18E-04 | 1.53E-04 | 2.09E+00 | yes | 3.32E+00 | 1.50E+03 | 2.21E-03 | no |
| Cobalt | 9.38E-05 | 2.20E+02 | 4.27E-07 | ٤ | 4.19E-01 | 6.00E+01 | 6.98E-03 | ou |
| Copper | 8.50E-01 | 1.46E+02 | 5.82E-03 | 2 | 3.79E+03 | 3.00E+03 | 1.26E+00 | yes |
| Lead | 1.70E-02 | 1.50E+00 | 1.13E-02 | 2 | 7.58E+01 | 1.50E+02 | 5.05E-01 | OL |
| Manganese | 4.17E-03 | 5.11E-02 | 8.17E-02 | ဥ | 1.86E+01 | 3.00E+03 | 6.21E-03 | ou |
| Nickel | 1.39E-09 | 7.30E+01 | 1.90E-11 | 2 | 6.20E+00 | 3.00E+03 | 2.07E-03 | no |
| Selenlum | NA | 1.83E+01 | | na | NA NA | 6.00E+02 | | na |
| Sliver | 5.71E-11 | 1.83E+01 | 3.13E-12 | 2 | 2.55E-01 | 3.00E+02 | 8.50E-04 | о С |
| Thalllum | AN | 2.56E-01 | | na | ΑN | 3,00E+02 | | na |
| Zinc | 1.34E-07 | 1.10E+03 | 1.22E-10 | no | 5.96E+02 | 3.00E+04 | 1.99E-02 | no |
| potnote: | | | | | | | | |

Footnote:

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

Cehonic = Chronic time-averaged concentration; HBSL = Chronic health-based screening level

Cacute = Acute concentration; ATV = Acute toxicity value

Table D-26: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

> 1? ш na na пa no ā na na na 2 na 2 g na na na na na no пa na na na E ā Cacute/ ATV 1.97E-05 1.31E-04 2.96E-04 6.82E-06 **Acute Toxicity** Value (µg/m³) 185mm propelling charge M3 (zone 5), M199 cannon 9.39E+03 9.58E+06 1.94E+06 1.56E+05 1.28E+05 5.38E+05 1.14E+04 1.21E+06 7.92E+05 8.08E+03 5.08E+05 1.38E+05 5.43E+05 2.06E+05 7.92E+06 7.92E+04 6.96E+05 9.76E+03 .64E+05 1.88E+05 1.54E+05 6.78E+05 6.51E+05 .28E+04 5.82E+04 2.81E+06 1.48E+07 Cacute (µg/m³) 9.14E+01 NA NA NA NA NA 1.56E+00 .28E+00 4.61E+01 **AREA AREA \$\$\$\$**\$ **A A A A A A A** DODIC: D540 > 12 2 пa na ē 2 ā Па na пa шa na g ā na 9 2 пa na na na na na na na g па na n 2.67E-06 8.58E-03 2.85E-06 C_{chronlc}/HBSL 7.11E-02 Screening Level Health-Based 1.12E+00 5.17E-02 5.17E-02 2.20E-02 3.74E-03 8.35E-02 9.89E-02 1.06E+03 1.28E-01 3.31E+00 .30E+02 2.32E+00 4.09E+00 1.04E+00 3.13E+04 5.21E+02 1.04E+03 4.02E+02 (mg/m³) 2.09E+02 1.07E+00 5.21E+00 7.30E+02 5.21E+02 3.65E+01 7.39E-02 8.73E-03 6.21E+01 2.49E-01 1.20E-01 C_{chronic} (µg/m³) NA NA NA NA NA NA 1.15E-03 1.39E-03 3.51E-02 1.77E-02 ΑN A A A A A A A A ₹ AAAAA 1,1,2-Trichloro-1,2,2-trifluoroethane trans-1,3-Dichloropropene Dichlorotetrafluoroethane Dichlorodifluoromethane cls-1,3-Dichloropropene Trichlorofluoromethane cis-1,2-Dichloroethene 1,1,2-Trichloroethane 1,1,1-Trichloroethane Carbon Tetrachloride 1,2-Dichloropropane 1,2-Dibromoethane 1,1-Dichloroethene 1,1-Dichloroethane 1,2-Dichloroethane Trichloromethane Tetrachloroethene 3-Chloropropene Dichloromethane Chlorobenzene Compound (a) Trichloroethene 100 meter location Methyl Chloride Methyl Bromide Vinyl Chloride 1,3-Butadlene Ethyl Chloride Ethylbenzene m&p-Xylene Benzene Toluene

Table D-26: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

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|-----------------------------------|------------------------------|--|--------------------------------|-----------------------------|---|---------------------------------|-------------|------|
| | | 155mm p | ropalling e | harge M3 (20 DÖDIC: D540 | 155inim propelling charge M3 (20ne 5), M799 cannon BODIC: D540 | M99 cannon | | |
| Compound (a) | С _{сhronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronle} / HBSL | > 1? | Cacute (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 1? |
| Styrene | ΑN | 1.06E+03 | | na | ΑN | 2.13E+05 | | па |
| 1,1,2,2-Tetrachloroethane | ΑN | 3.31E-02 | | na | AA | 2.06E+04 | | na |
| o-Xylene | ΑN | 7.30E+02 | | na | ΝA | 6.51E+05 | | na |
| 4-Ethyltoluene | ΝΑ | NV | | na | NA | 1.25E+05 | | na |
| 1,3,5-Trimethylbenzene | AN | 6.21E+00 | • | na | NA | 3,68E+05 | | па |
| 1,2,4-Trimethylbenzene | NA | 6.21E+00 | | na | NA | 1.80E+05 | | na |
| Benzyl Chloride | AN | 3.96E-02 | | na | NA | 5.20E+03 | | na |
| m-Dichlorobenzene | NA | 3.29E+00 | | na | AN | 3.61E+04 | | na |
| p-Dichlorobenzene | AN | 3.06E-01 | | na | NA | 6.61E+05 | | na |
| o-Dichlorobenzene | NA | 2.09E+02 | | na | NA | 3.01E+05 | | na |
| 1,2,4-Trichlorobenzene | AN | 2.08E+02 | | na | NA | 3.71E+04 | | na |
| Hexachlorobutadiene | NA | 8.62E-02 | | na | NA | 3.21E+04 | | na |
| Hydrocarbons | | | | | | | | |
| Methane | 9.69E-01 | N N | | na | 4.33E+03 | 3.30E+06 | 1.31E-03 | no |
| Ethane | NA | N N | | na | NA | ۷V | | na |
| Ethylene | NA | N< | | na | AA | 4.60E+05 | | na |
| Propane | NA | N . | | na | NA | 3.78E+06 | | na |
| Acetylene | NA | N\ | | na | NA | ۷V | | na |
| Isobutane | NA | NV | | na | AN | 9.52E+05 | | na |
| n-Butane | NA | NV | | na | NA | 5.71E+06 | | na |
| Propylene | NA | N N | | na | NA | NA | | na |
| Footnotes: NA = Not amilicable | | | | | | | | |
| | | | | | | | | • |

NA = Not applicable

na = Not available because health-based screening value is not available or not applicable because compound was not detected.

NV = No value

C_{chronic} = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

Cacute = Acute concentration

ATV = Acute toxicity value

Table D-27: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

| | | 155mmfp | ropalling | Sharge | 155mm propelling charge M3 (zone 5), M199 cannon DODIC: D\$40 | /199 cannon | | |
|-----------------------------|------------------------------|--|--------------------------------|--------|--|---------------------------------|-------------|----------|
| Compound | C _{chronte} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chrontc} / HBSL | > 12 | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| SVOCs | | | | | | | | |
| n-nitrosodimethylamine | Ą | 1.37E-04 | | na | AN | 2.50E+03 | | na |
| bis(2-chloroethyl)ether | ¥ | 5.82E-03 | | na | AN | 5.85E+04 | | na |
| phenol | 1.75E-03 | 2.19E+03 | 8.01E-07 | ou | 7.84E+00 | 3.85E+04 | 2.04E-04 | n On |
| 2-chlorophenol | ₹ | 1.83E+01 | | na | ΑN | 5.25E+03 | | na |
| 1,3-dichlorobenzene | N A | 3.29E+00 | | na | NA | 3.61E+04 | | na |
| 1,4-dichlorobenzene | NA | 3.06E-01 | | na | NA | 6.61E+05 | | na |
| 1,2-dichlorobenzene | ΑN | 2.09E+02 | | na | NA | 3.01E+05 | | na |
| benzyl alcohol | NA | 1.10E+03 | | na | NA | 5.53E+04 | | na |
| bis(2-chlorolsopropyl)ether | NA | 1.92E-01 | | na | NA | 6.99E+04 | | · na |
| 2-methylphenol | NA | 1.83E+02 | | na | NA | NA | | na |
| hexachloroethane | NA | 4.80E-01 | | na | NA | 2.90E+04 | | na |
| n-nitroso-di-n-propylamine | NA | 9.61E-04 | | na | NA | 2.00E+02 | | na |
| 4-methylphenol | NA | 1.83E+02 | | na | NA | NA | | na |
| nitrobenzene | AN | 2.09E+00 | | na | NA | 1.51E+04 | | na |
| isophorone | NA | 7.08E+00 | | na | AN | 2.83E+04 | | na |
| 2-nitrophenol | NA | N | | na | NA | AA | | na |
| 2,4-dimethylphenol | NA | 7.30E+01 | | na | ΑN | ΝΑ | | na |
| bis(2-chloroethoxy)methane | NA | N | | na | NA | NA | | na |
| 2,4-dichlorophenol | ΝΑ | 1.10E+01 | | na | ΑA | 3.00E+04 | | na |
| 1,2,4-trichlorobenzene | NA | 2.08E+02 | | na | Ϋ́ | 3.71E+04 | | na |
| naphthalene | 1.16E-03 | 3.13E+00 | 3.70E-04 | 2 | 5.17E+00 | 7.86E+04 | 6.58E-05 | <u>о</u> |
| 4-chloroanlline | NA A | 1.46E+01 | · | ВE | AN A | 3.00E+04 | | na |
| hexachlorobutadiene | NA | 8.62E-02 | | na | ΑA | 3.21E+04 | | na |
| 4-chloro-3-methylphenol | NA | NV | | na | NA | 2.00E+04 | | na |
| 2-methylnaphthalene | NA | 7.30E+01 | | na | NA | 2.00E+04 | | na |
| hexachlorocyclopentadiene | NA | 7.30E-02 | | na | NA | 2.23E+02 | | na |
| 2,4,6-trichlorophenol | NA | 1.10E+02 | | na | NA | AN. | | na |
| 2,4,5-trichlorophenol | NA AN | 3.65E+02 | | na | ΑN | 3.00E+04 | | na |
| 2-chloronaphthalene | NA | 2.92E+02 | | na | ΑΝ | 6.00E+02 | | na |
| 2-nitroaniline | NA | 2.09E-01 | | na | AA A | ΝΑ | | na |
| dimethylphthalate | NA | 3.65E+04 | | na | NA | 1.50E+04 | | na |
| 2,6-dinitrotoluene | NA | 3.65E+00 | | na | ΑΝ | 6.00E+02 | | na |

Table D-27: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

| | | 185mm p | ropalling | charge DODIC | 155mm propalling charge M3 (zone 6), M199 cannon DODIC: D540 | //199 carindn | | |
|----------------------------|------------------|--|--------------------------------|-----------------|---|---------------------------------|-------------|------|
| Compound | Cchronic (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (μg/m³) | Cacute/ ATV | > 1? |
| 3-nitroaniline | AN | >≥ | | na | AN | 9.00E+03 | | na |
| 2,4-dinitrophenol | NA | 7.30E+00 | | na | AN | 7.50E+03 | | na |
| dibenzofuran | ΑN | 1.46E+01 | | na | NA | AN | | na |
| 2,4-dinitrotoluene | NA | 7.30E+00 | | na | NA | 6.00E+02 | | na |
| 4-nitrophenol | AN | 2.92E+01 | | na | NA | 3.00E+04 | | na |
| 4-chlorophenyl-phenylether | ΑN | N | | na | NA | AN | | na |
| diethylphthalate | Ą | 2.92E+03 | | na | NA | 1.50E+04 | | na |
| 4-nitroaniline | NA | ۸N | | na | NA | 9.00E+03 | | na |
| 4,6-dinitro-2-methylphenol | AN | 3.65E-01 | | na | NA | 5.00E+02 | | na |
| n-nitrosodiphenylamine(1) | AN | 1.37E+00 | | na | NA | NA | | na |
| 4-bromophenyl-phenylether | AN | NN | | na | NA | NA | | na |
| hexachlorobenzene | AN | 4.18E-03 | | na | NA | 7.50E+01 | | na |
| pentachlorophenol | NA | 5.60E-02 | | na | NA | 1.50E+03 | | na |
| di-n-butyiphthalate | NA | 3.65E+02 | | na | NA | 1.50E+04 | | na |
| butylbenzylphthalate | AN | 7.30E+02 | | na | NA. | 5.00E+05 | | ua |
| bis(2-ethylhexyl)phthalate | 2.01E-02 | 4.80E-01 | 4.18E-02 | ou | 2.09E+02 | 1.00E+04 | 2.09E-02 | ou |
| di-n-octylphthalate | NA | 7.30E+01 | | na | NA | 1.50E+05 | | na |

Footnotes:

NA = Not applicable

na = Not available because health-based screening value is not available or not applicable because compound was not detected.

NV = No value

Cerronic = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

Cacute = Acute concentration

ATV = Acute toxicity value

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Table D-28: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aidehydes, and Acid Gases

| | | 156mn | n propelling | charge | 155mm propelling charge M3 (zone 5), M199 cannon | M199 cannon | | |
|-------------------------------------|--|--|--|--------|--|--|-------------|-----------------------|
| | A Commence of the Section of the Commence of t | en e | NA KINGSON WATER STATE OF THE PARTY OF THE P | JOOO | DODIC: D540 | The second of the second of the second | 1000 | in America Confession |
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 12 | С _{асиге} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | >13 |
| PAHs | | | | | | | | |
| acenaphthylene | 1.54E-04 | N | | na | 6.87E-01 | 2.00E+02 | 3.44E-03 | ou |
| acenaphthene | AA | 2.19E+02 | | na | NA | 1.25E+03 | | na |
| fluorene | 8,23E-05 | 1.46E+02 | 5.64E-07 | no | 3.68E-01 | 7.50E+04 | 4.90E-06 | ou |
| phenanthrene | 2.38E-04 | N N | | na | 1.06E+00 | 2.00E+03 | 5.31E-04 | ou |
| anthracene | 3.11E-05 | 1.10E+03 | 2.84E-08 | ou ' | 1.39E-01 | 6.00E+03 | 2.31E-05 | ou |
| fluoranthene | 1.64E-04 | 1.46E+02 | 1.13E-06 | no | 7.34E-01 | 3.00E+01 | 2.45E-02 | no |
| pyrene | 5.01E-04 | 1.10E+02 | 4.57E-06 | uo | 2.24E+00 | 1.50E+04 | 1.49E-04 | ou |
| benzo(a)anthracene | 1.23E-05 | 2.17E-02 | 5.68E-04 | no | 1.28E-01 | 6,00E+02 | 2.14E-04 | no |
| chrysene | 1.33E-05 | 2.17E+00 | 6.11E-06 | ou | 1.38E-01 | 2.00E+02 | 6.91E-04 | no |
| benzo(b)fluoranthene | 2.40E-05 | 2.17E-02 | 1.11E-03 | no | 6.24E-02 | AN | | na |
| benzo(k)fluoranthene | 3.15E-05 | 2.17E-01 | 1.45E-04 | uo | 8.20E-02 | AN | | na |
| benzo(a)pyrene | 4.40E-05 | 2.17E-03 | 2.03E-02 | no | 4.58E-01 | 7.50E+03 | 6.11E-05 | no |
| Indeno(1,2,3-cd)pyrene | 7.05E-05 | 2.17E-02 | 3.25E-03 | no | 1.84E-01 | AN | | na |
| dibenz(a,h)anthracene | 2.23E-06 | 2.17E-03 | 1.03E-03 | no | 2.32E-02 | 3.00E+04 | 7.73E-07 | no |
| benzo(g,h,l)perylene | 3.95E-04 | N | | na | 1.76E+00 | 3.00E+04 | 5.88E-05 | no |
| Dioxins / Furans | | | | | | | | |
| 2378-Tetrachlorodibenzo-p-dloxin | 2.03E-09 | 4.48E-08 | 4.52E-02 | no | 2.11E-05 | 3.50E+00 | 6.04E-06 | no |
| 12378-Pentachlorodibenzo-p-dloxin | 6.59E-10 | NV | | na | 2.94E-06 | 2.50E+00 | 1.18E-06 | no |
| 123478-Hexachlorodibenzo-p-dioxin | NA | N | | na | NA | NA | | na |
| 123678-Hexachlorodibenzo-p-dioxin | 1.91E-09 | N | | na | 8.55E-06 | 1.50E+01 | 5.70E-07 | no |
| 123789-Hexachlorodibenzo-p-dioxin | 2.99E-10 | 1.48E-06 | 2.02E-04 | uo | 7.79E-07 | NA | | na |
| 1234678-Heptachlorodlbenzo-p-dioxin | 1.65E-08 | N | | na | 1.84E-05 | NA | | na |
| Octachlorodibenzo-p-dloxin | 9.60E-08 | N | | na | 1.07E-04 | NA | | na |
| 2378-Tetrachlorodibenzo-p-furan | 2.08E-09 | N | | na | 9.29E-06 | 2,00E+00 | 4.64E-06 | no Or |
| 12378-Pentachlorodlbenzo-p-furan | 1.95E-09 | N | | na | 2.18E-06 | NA | | na |
| 23478-Pentachlorodibenzo-o-furan | 9.11E-10 | N | | na | 4.07E-06 | 7.50E-02 | 5.42E-05 | no |
| 123478-Hexachlorodibenzo-p-furan | 1.54E-09 | N | | na | 6.86E-06 | 7:50E+00 | 9.15E-07 | no |
| 123789-Hexachlorodibenzo-p-furan | ΝΑ | N | | na | NA A | NA | | na |
| 234678-Hexachlorodibenzo-p-furan | 6.41E-10 | N | | na | 2.86E-06 | 1.50E+00 | 1.91E-06 | no |
| 1234678-Heptachlorodibenzo-p-furan. | 6.93E-09 | NV | | na | 7.73E-06 | NA | | na |
| 1234789-Heptachlorodlbenzo-p-furan | , 3.24E-10 | ≥ | | na | 3.61E-07 | ۷A | | na |
| OCDF | 4.36E-09 | Š | | na | 4.87E-06 | NA | | na |
| Aldehydes | | | | | | | | |
| Formaldehyde | AM | 1.48E-01 | | na | NA | 1.23E+03 | | na |

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Table D-28: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aldehydes, and Acid Gases 100 meter location

| | | 155mm | n propelling | charge | 155mm propelling charge M3 (2one 5), M199 cannon | M199 cannon | | |
|--------------------------|------------------------------|--|--------------------------------|--------|--|--|--------------------------------------|------|
| | | | A COLOR SOLVE | MOUIC | യയവടു: ധാഷ | A SOLIN SOLICE AND AND SOLICE AND AND ASSOCIATION OF THE PERSON ASSOCIATION AND ASSOCIATION AND ASSOCIATION ASSOCI | Michigan Kongan Laban and Kanasa and | |
| Compound | С _{сhronte} (µg/m³) | Health-Based Screening Level (µg/m³) | G _{chrontc} / HBSL | > 1? | C _{scute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| Acetaldehyde | ΑN | 8.73E-01 | | na | A'N | 1.80E+04 | | na |
| Acetone | ¥ | 3.65E+02 | | na | NA | 2.37E+06 | | na |
| Acrolein | ΑN | 2.09E-02 | | na | NA | 2,30E+02 | | na |
| Proprionaldehyde | AN | N/ | | na | NA | 7.50E+04 | | na |
| Crotonaldehyde | NA | 3.54E-03 | | na | NA | 5.72E+03 | | na |
| Butyraldehyde | ΑN | N/ | | , na | NA | 7.38E+04 | | na |
| Benzaldehyde | NA | 3.65E+02 | | na | NA | 1.50E+04 | | na |
| Isovaleraldehyde | NA | NV | | na | ΝA | AN | | na |
| Valeraldehyde | NA | N . | | na | ΝΑ | AN | | na |
| o,m,p-Tolualdehyde | NA | N/ | | na | NA | ΑN | | na |
| Hexaldehyde | NA | N | | na | NA | AN | | na |
| 2,5-Dimethylbenzaldehyde | NA | N | | na | NA | AN | | na |
| Acid Gases | | | | | | | | |
| Hydrogen fluoride | NA I | N | | na | NA | 1.60E+03 | | na |
| Hydrogen chloride | NA | 2.08E+01 | | na | NA | 4.50E+03 | | na |
| Hydrogen bromide | NA | N | | na | AN | 9.93E+03 | | na |
| Nitric Acid | NA | N | | na | NA | 5.16E+03 | | na |
| Phosphoric acid | NA | 1.04E+01 | | na | AN | 3.00E+03 | | na |
| Sulfuric Acid | NA | N< | | na | NA | 2.00E+03 | | na |

Footnote:

NA = Not applicable because compound was not detected. na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

Cohronic = Chronic time-averaged concentration; HBSL = Chronic health-based screening level Cecute = Acute concentration; ATV = Acute toxicity value

Table D-29: Comparison of Air Concentrations With Health-Based Values: Cyanides and Energetics

| | | 1,85mr | n propelling | charge | 155mm propelling charge M3 (zone 5), M199 cannon DODIC: D540 | f199 cannon | | |
|---|------------------------------|--|--------------------------------|--------|---|---------------------------------|-------------|------|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 12 | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 1? |
| Particulate Cyanide and Hydrogen Cvanide (CN) | | | | | | | | |
| Particulate Cvanide | 6.72E-02 | 7.30E+01 | 9.21E-04 | 2 | 3.00E+02 | 5.00E+03 | 6.00E-02 | 00 |
| Hydrogen Cyanide | 9.24E-01 | 3.13E+00 | 2.95E-01 | no | 4.13E+03 | 5.17E+03 | 7.98E-01 | DD |
| Energetics | | | | | | | | |
| Nitrobenzene | ΑΝ | 2.09E+00 | • | na | NA | 1.51E+04 | | na |
| 2-Nitrotoluene | AN | 3.65E+01 | | na | NA | NA | | na |
| 3-Nitrotoluene | ΑN | 3.65E+01 | | na | NA | NA | | na |
| 4-Nitrotoluene | Ϋ́ | 3.65E+01 | | na | NA | 3.37E+04 | | na |
| Nitroglycerine | ٩٧ | 4.80E-01 | | na | AN | NA | | na |
| 1,3-Dinitrobenzene | AN | 3.65E-01 | | na | NA | 3.00E+03 | | na |
| 2,6-Dinitrotoluene | AN | 3.65E+00 | | na | NA | 6.00E+02 | | na |
| 2,4-Dinitrotoluene | ΑN | 7.30E+00 | | na | NA | 6.00E+02 | | na |
| 1,3,5-Trinitrobenzene | NA | 1.10E+02 | | na | NA | 3.00E+04 | | na |
| 2,4,6-Trinitrotoluene | AN | 2.24E-01 | | na | NA | 2.50E+04 | | na |
| RDX | NA | 6.11E-02 | | na | NA | NA | | na |
| 4-Amino-2,6-Dinitrotoluene | NA | NV | | | NA | NA | | |
| 2-Amino-4,6-Dinitrotoluene | NA | NV | | | NA | 1.50E+04 | | |
| Tetryl | AN | 3.65E+01 | | na | NA | NA | | na |
| HMX | AN | 1.83E+02 | | na | ΑN | NA | | na |
| Pentaerythritoltetranitrate | NA | NV | | na | ΝΑ | 5.00E+01 | | na |
| Dibutyl phthalate | NA | 3.65E+02 | | na | NA | 1.50E+04 | | na |
| Dioctyl phthalate | NA | 4.80E-01 | | na | NA | 1.00E+04 | | na |
| Diphenylamine | NA | 9.13E+01 | | na | NA | 3.00E+04 | | na |
| Footnote: | 7 - 7 - 7 | | | | | | | |

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

Cchronic = Chronic time-averaged concentration; HBSL = Chronic health-based screening level

Cacute = Acute concentration; ATV = Acute toxicity value

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Table D-30: Comparison of Air Concentrations With Health-Based Values: Total Petroleum Hydrocarbons 100 meter location

| | lwws. | 155mm propelling charge M3 (zone 5), M199 cannon DODIC: ជី540 | :harge M3 (zone 5), M19! DGDIG:: D540 | cannon |
|--------------------------------------|------------------------------|--|--|------------------------------|
| Compound (a) | С _{сһгопіс} (µg/m³) | C _{chronic} (µg/m³) | С _{сһтопіс} (µg/m³) | C _{ohronic} (µg/m³) |
| | Allphatic:C<=8 | Allphatic:C>8 | Aromatic:C<=8 | Aromatic:C>8 |
| Benzene | AN | NA | 4.13E-02 | NA |
| Toluene | ΨN | ΑN | 1.15E-03 | NA |
| naphthalene | ΥN | YN · | AN | 1.16E-03 |
| acenaphthylene | AN | NA | ΑN | 1.54E-04 |
| acenaphthene | NA | AN | AN | |
| fluorene | AN | NA | AN | 8.23E-05 |
| phenanthrene | AN | AN | AN | 2.38E-04 |
| anthracene | NA | NA | AN | 3.11E-05 |
| Total (µg/m³) | 00+300 ⁰ | 0.00E+00 | 4.25E-02 | 1.66E-03 |
| Derived Health-Based Screening Level | 1.92E+04 | 1.04E+03 | 4.17E+02 | 2.09E+02 |
| C _{chronic} /HBSL | 0.00E+00 | 0.00E+00 | 1.02E-04 | 7.98E-06 |
| >1? | uo | no | no | no |
| | | | | |

Footnotes:

>1? = Is the ratio greater than one?

NA = Not Applicable because compound was not detected

C_{chronic} = chronic averaged air Concentration (not adjusted for cancer averaging time of 70 years)

HBSL = Health-Based Screening Level

RISK EVALUATION DATA FOR CHARGE M3, FIRED FROM THE M199 CANNON, ZONE 5, 200 METERS DOWNWIND

Table D-31: Comparison of Air Concentrations With Health-Based Values: Gases, Particulates and Metals 200 meter location

| ZUU MBIBI IOCANON | | | | | | | | |
|-----------------------------------|------------------------------|--|--------------------------------|-----------------|---|---------------------------------|--------------------------|---------|
| | | 155mn | n propelling | charge DODIC | 155mm propelling charge M3 (zone 5), M199 cannon DODIC: D540 | VI199 cannon | ÷. | |
| Compound | С _{сhronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | С _{асиtе} (µg/m³) | Acute Toxicity Value (µg/m³) | C _{acute} / ATV | > 12 |
| Gases | | | | | | | | |
| NH3 | 1.85E+00 | 1.04E+02 | 1.77E-02 | ou | 2.07E+03 | 1.75E+04 | 1.18E-01 | 92 |
| Carbon Dloxide (CO ₂) | 2.38E+01 | λ | | na | 1.06E+05 | 5.40E+07 | 1.97E-03 | on S |
| Carbon Monoxide (CO) | 6.26E+01 | 1.57E+02 | 3.99E-01 | uo | 6.99E+04 | 2.30E+05 | 3.04E-01 | no |
| Nitrogen Oxides (as NO) | 8.67E-01 | 1.00E+02 | 8.67E-03 | ou | 3.87E+03 | 2.70E+05 | 1.43E-02 | no |
| Methane (CH ₄) | NA | N/ | | ua | NA | 3.30E+06 | | na |
| Sulfur Dioxide (SO ₂) | NA | 8.00E+01 | | eu | VΝ | 7.89E+02 | | na |
| Combined Particulate | | | | | | | | |
| TSP | 2.59E+00 | 5.00E+01 | 5.18E-02 | ou | 2.89E+03 | NA | | na |
| PM ₁₀ | 1.85E+00 | 5.00E+01 | 3.70E-02 | ou | 2.06E+03 | AN | | na |
| PM _{2.5} | 7.32E-01 | 1.50E+01 | 4.88E-02 | ou | 8.17E+02 | ΑN | | na |
| Metals | | | | | | | | |
| Antimony | 6.43E-11 | 1.46E+00 | 4.41E-11 | ou | 2.87E-01 | 1.50E+03 | 1.92E-04 | 2 |
| Arsenic | 6.11E-05 | 4.47E-04 | 1.37E-01 | ou | 6.37E-01 | 3,00E+01 | 2.12E-02 | no |
| Barlum | 1.40E-03 | 5.21E-01 | 2.69E-03 | ou | 6.25E+00 | 1.50E+03 | 4.17E-03 | no |
| Beryllium | NA | 8.00E-04 | | na | NA | 5.00E+00 | | na |
| Cadmium | 2.09E-05 | 1.07E-03 | 1.96E-02 | ou | 2.18E-01 | 3.00E+01 | 7.26E-03 | no |
| Chromlum | 1.32E-04 | 1.53E-04 | 8.63E-01 | ou | 1.37E+00 | 1.50E+03 | 9.16E-04 | no |
| Cobalt | 3.88E-05 | 2.20E+02 | 1.77E-07 | ou | 1.73E-01 | .6.00E+01 | 2.89E-03 | no |
| Copper | 3.52E-01 | 1.46E+02 | 2.41E-03 | uo | 1.57E+03 | 3.00E+03 | 5.23E-01 | ou |
| Гева | 7.02E-03 | 1.50E+00 | 4.68E-03 | ou | 3.14E+01 | 1.50E+02 | 2.09E-01 | no |
| Manganese | 1.73E-03 | 5.11E-02 | 3.38E-02 | no | 7.71E+00 | 3.00E+03 | 2.57E-03 | no |
| Nickel | 5.75E-10 | 7.30E+01 | 7.88E-12 | 20 | 2.57E+00 | 3.00E+03 | 8.56E-04 | no |
| Selenium | NA | 1.83E+01 | | na | NA | 6.00E+02 | | na |
| Silver | 2.36E-11 | 1.83E+01 | 1.29E-12 | ဥ | 1.06E-01 | 3.00E+02 | 3.52E-04 | no |
| Thallium | NA | 2.56E-01 | | na | NA | 3.00E+02 | | na |
| Zinc | 5.53E-08 | 1.10E+03 | 5.05E-11 | 2 | 2.47E+02 | 3.00E+04 | 8.23E-03 | no |
| Footnote: | | | | | | | | |

NA = Not applicable because compound was not detected.
na = Not available because health-based screening value is not available or not applicable if compound was not detected.
NV = No value

 C_{chronic} = Chronic time-averaged concentration; HBSL = Chronic health-based screening level C_{acute} = Acute concentration; ATV = Acute toxicity value

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Table D-32: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

| | | 4 Elimen n | A Selliana | N. W. W. W. | NA June El B | 4400 AAAA | | |
|---------------------------------------|------------------------------|--|--------------------------------|-------------|----------------------------|---------------------------------|--------------------------|---------|
| | | | | | DODIC: D\$40 | | | , |
| Compound (a) | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 12 | С _{асиtе} (µg/m³) | Acute Toxicity Value (µg/m³) | C _{acute} / ATV | > 1? |
| VOCs | | | | | | | | |
| Dichlorodifluoromethane | NA | 2.09E+02 | | na | NA | 1.48E+07 | | na |
| Methyl Chloride | NA | 1.07E+00 | | na | NA | 2.06E+05 | | na |
| Dichlorotetrafluoroethane | NA | N | | na | NA | NA | | na |
| Vinyl Chloride | NA | 2.20E-02 | • | na | ۸A | 1.28E+04 | | na |
| 1,3-Butadiene | NA | 3.74E-03 | | na | NA | 2.20E+04 | | na |
| Methyl Bromide | NA | 5.21E+00 | | na | NA | 5.82E+04 | | na |
| Ethyl Chloride | NA | 2.32E+00 | | na | NA | 7.92E+06 | | na |
| Trichlorofluoromethane | NA | 7.30E+02 | | na | NA | 2.81E+06 | | na |
| 1,1-Dichloroethene | 5.77E-04 | 5.21E+02 | 1.11E-06 | no | 6.44E-01 | 7.92E+04 | 8.14E-06 | 2 |
| Dichloromethane | 1.45E-02 | 4.09E+00 | 3.55E-03 | no | 3.78E+01 | 6.96E+05 | 5.44E-05 | on O |
| 3-Chloropropene | NA | 1.04E+00 | | na | NA | 9.39E+03 | | na |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | NA | 3.13E+04 | | na | ΑN | 9.58E+06 | | na |
| 1,1-Dichloroethane | NA | 5.21E+02 | | na | ΑΝ | 1.21E+06 | | na |
| cls-1,2-Dichloroethene | NA | 3.65E+01 | | na | NA | 7.92E+05 | | na |
| Trichtoromethane | NA | 8.35E-02 | | na | NA | 9.76E+03 | | na |
| 1,2-Dichloroethane | NA | 7.39E-02 | | na | NA | 8.08E+03 | | na |
| 1,1,1-Trichloroethane | NA | 1.04E+03 | | na | ΑN | 1.94E+06 | | na |
| Benzene | 7.33E-03 | 2.49E-01 | 2.94E-02 | on | 1.91E+01 | 1.56E+05 | 1.22E-04 | no |
| Carbon Tetrachloride | NA | 1.28E-01 | | na | A A | 1.28E+05 | | na |
| 1,2-Dichloropropane | AN A | 9.89E-02 | | na | ΑΝ | 5.08E+05 | | na |
| Trichloroethene | ٩V | 1.12E+00 | | na | NA A | 5.38E+05 | | na |
| cis-1,3-Dichloropropene | NA | 5.17E-02 | | na | Ϋ́ | 1.14E+04 | | na |
| trans-1,3-Dichloropropene | ΑN | 5.17E-02 | | na | ΑΝ | NA | | na |
| 1,1,2-Trichloroethane | A A | 1.20E-01 | | na | ΝΑ | 1.64E+05 | | na |
| Toluene | 4.74E-04 | 4.02E+02 | 1.18E-06 | no | 5.29E-01 | 1.88E+05 | 2.82E-06 | no |
| 1,2-Dibromoethane | NA | 8.73E-03 | | na | NA | 1.54E+05 | | na |
| Tetrachloroethene | NA | 3.31E+00 | | na | NA | 6.78E+05 | | na |
| Chlorobenzene | NA | 6.21E+01 | | na | ΑΝ | 1.38E+05 | | na |
| Ethylbenzene | AA A | 1.06E+03 | | na | ΝΑ | 5.43E+05 | | na |
| m&p-Xylene | AN | 7.30E+02 | | na | NA | 6.51E+05 | | na |

Table D-32: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

200 meter location

| ZUU IIIBIBI IOCALIOII | | | | | | | | |
|---------------------------|------------------------------|---------------------------------|------------|------------------------------|---|----------------|-------------|------|
| | | 155mm pr | opelling c | iharge M3 (zo DODIC: D540 | 155mm propelling charge M3 (zone 5), M199 cannon DODIC: D540 | //199 cannon | | |
| Compound (a) | C _{chronic} (ua/m³) | Health-Based Screening Level | Cehronic/ | > 1? | Cacuta (ug/m³) | Acute Toxicity | Cacute/ ATV | > 1? |
| | | (µg/m³) | HBSL | | | Value (µg/m²) | | |
| Styrene | ΑN | 1.06E+03 | | na | NA | 2.13E+05 | | na |
| 1,1,2,2-Tetrachloroethane | ΑΝ | 3.31E-02 | | na | NA | 2.06E+04 | | na |
| o-Xylene | AN | 7.30E+02 | | na | NA | 6.51E+05 | | na |
| 4-Ethyltoluene | ΑN | ΛN | | na | NA | 1.25E+05 | | na |
| 1,3,5-Trimethylbenzene | ΨN | 6.21E+00 | • | na | NA | 3.68E+05 | | na |
| 1,2,4-Trimethylbenzene | ΑN | 6.21E+00 | | na | NA | 1.80E+05 | | na |
| Benzyl Chloride | Ϋ́ | 3.96E-02 | | na | NA | 5.20E+03 | | na |
| m-Dichlorobenzene | ΝΑ | 3.29E+00 | | na | NA | 3.61E+04 | | na |
| p-Dichlorobenzene | ΝΑ | 3.06E-01 | | na | NA | 6.61E+05 | | na |
| o-Dichlorobenzene | ΝΑ | 2.09E+02 | | na | NA | 3.01E+05 | | na |
| 1,2,4-Trichlorobenzene | AA | 2.08E+02 | | na | NA | 3.71E+04 | | na |
| Hexachlorobutadlene | NA | 8.62E-02 | | na | NA | 3.21E+04 | | na |
| Hydrocarbons | | | | | | | | |
| Methane | 4,01E-01 | N/ | | na | 1.79E+03 | 3.30E+06 | 5.43E-04 | no |
| Ethane | NA | N | | na | NA | NA V | | na |
| Ethylene | NA | N | | na | NA | 4.60E+05 | | na |
| Propane | ΝA | NV | | na | NA | 3.78E+06 | | na |
| Acetylene | NA | N | | na | NA A | ٩N | | na |
| Isobutane | NA | 2 | | na | NA | 9.52E+05 | | na |
| n-Butane | NA | N | | na | ΑΝ | 5.71E+06 | | na |
| Propylene | NA | N | | na | NA | NA | | na |
| | | | | ĺ | | | | |

Footnotes:

NA = Not applicable

na = Not available because health-based screening value is not available or not applicable because compound was not detected.

NV = No value

C_{chronte} = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

C_{acute} = Acute concentration

ATV = Acute toxicity value

Table D-33: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

| | | 155mm p | ropelling | harge | 155mm propelling charge M3 (zone 5), M199 cannon กลักเรา กรสง | W199 cannon | | |
|-----------------------------|------------------------------|--|--------------------------------|-------|--|---------------------------------|-------------|------|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (ug/m³) | C _{chronic} / HBSL | > 12 | Cacute (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| SVOCs | | | | | | | | |
| n-nitrosodimethylamine | NA NA | 1.37E-04 | | na | NA NA | 2.50E+03 | | na |
| bls(2-chloroethyl)ether | ΑN | 5.82E-03 | | na | NA AA | 5.85E+04 | | na |
| phenol | 7.26E-04 | 2.19E+03 | 3.32E-07 | 2 | 3.24E+00 | 3.85E+04 | 8.43E-05 | 2 |
| 2-chlorophenol | AN | 1.83E+01 | | na | AN | 5.25E+03 | | na |
| 1,3-dichlorobenzene | NA | 3.29E+00 | | na | ΑN | 3.61E+04 | | na |
| 1,4-dichlorobenzene | AN | 3.06E-01 | | na | ΑΝ | 6.61E+05 | | na |
| 1,2-dichlorobenzene | NA | 2.09E+02 | | na | NA | 3.01E+05 | | na |
| benzyl alcohol | NA | 1.10E+03 | | na | ΑN | 5.53E+04 | | na |
| bis(2-chloroisopropyl)ether | NA | 1.92E-01 | | na | AN | 6.99E+04 | | na |
| 2-methylphenol | NA | 1.83E+02 | | na | ĀN | NA | | na |
| hexachloroethane | NA | 4.80E-01 | | na | NA | 2.90E+04 | | na |
| n-nitroso-di-n-propylamine | NA | 9.61E-04 | | na | AN | 2.00E+02 | | na |
| 4-methylphenol | NA | 1.83E+02 | | na | AN | NA | | na |
| nitrobenzene | NA | 2.09E+00 | | na | NA | 1.51E+04 | | na |
| isophorone | NA | 7.08E+00 | | na | NA | 2.83E+04 | | na |
| 2-nitrophenol | NA | NV | | na | NA | NA | | na |
| 2,4-dimethylphenol | NA | 7.30E+01 | | na | NA | NA | | na |
| bis(2-chloroethoxy)methane | NA | N< | | na | NA | NA | | na |
| 2,4-dichlorophenol | ΝΑ | 1.10E+01 | | na | NA | 3.00E+04 | | na |
| 1,2,4-trichlorobenzene | NA | 2.08E+02 | | na | ΑΝ | 3.71E+04 | | na |
| naphthalene | 4.80E-04 | 3.13E+00 | 1.53E-04 | ou | 2.14E+00 | 7.86E+04 | 2.73E-05 | no |
| 4-chloroanlline | ΑΝ | 1.46E+01 | | na | NA | 3.00E+04 | | na |
| hexachlorobutadiene | NA A | 8.62E-02 | | na | ΑΝ | 3.21E+04 | | na |
| 4-chloro-3-methylphenol | AA | N | | na | ΝΑ | 2.00E+04 | | na |
| 2-methylnaphthalene | NA | 7.30E+01 | | na | NA | 2.00E+04 | | na |
| hexachlorocyclopentadlene | NA | 7.30E-02 | | na | NA | 2.23E+02 | | na |
| 2,4,6-trichlorophenol | NA | 1.10E+02 | | na | NA | NA | | na |
| 2,4,5-trichlorophenol | NA | 3.65E+02 | | na | AN | 3.00E+04 | | na |
| 2-chloronaphthalene | NA | 2.92E+02 | | na | NA | 6.00E+02 | | na |
| 2-nitroaniline | NA | 2.09E-01 | | na | NA | NA | | na |
| dimethylphthalate | NA | 3.65E+04 | | na | ΑΝ | 1.50E+04 | | na |
| 2,6-dinitrotoluene | NA | 3,65E+00 | | na | ۸A | 6.00E+02 | | na |

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Table D-33: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

| | Anna Arana Anna Arana III an arana M3 (2005) |
|--------------------|--|
| 200 meter location | |

| | ē | 155mm p | ropelling c | charge M3 (zo DODIC: D540 | 155mm propelling charge M3 (zone 5), M199 cannon DODIC: D540 | //199 cannon | | |
|----------------------------|------------------------------|--|--------------------------------|------------------------------|---|---------------------------------|-------------|------|
| Compound | С _{сhrontc} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 12 | С _{асиte} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| 3-nitroaniline | AN | λN | | na | NA | 9.00E+03 | | na |
| 2,4-dinitrophenol | NA | 7.30E+00 | | na | NA | 7.50E+03 | | na |
| dibenzofuran | AA | 1.46E+01 | | na | NA | NA | | na |
| 2,4-dinitrotoluene | NA | 7.30E+00 | | na | NA | 6.00E+02 | | na |
| 4-nitrophenol | NA | 2.92E+01 | | na | ۸A | 3.00E+04 | | na |
| 4-chlorophenyl-phenylether | ΑA | N. | | na | NA | NA | | na |
| diethylphthalate | NA | 2.92E+03 | | na | NA | 1.50E+04 | | na |
| 4-nitroaniline | NA | N/ | | na | NA | 9.00E+03 | | na |
| 4,6-dinltro-2-methylphenol | NA | 3.65E-01 | | na | NA | 5.00E+02 | | na |
| n-nitrosodiphenylamine(1) | NA | 1.37E+00 | | na | NA | NA | | na |
| 4-bromophenyl-phenylether | NA A | ΛN | | na | NA | NA | | na |
| hexachlorobenzene | NA | 4.18E-03 | | na | NA | 7.50E+01 | | na |
| pentachlorophenol | ΑA | 5.60E-02 | | na | NA | 1.50E+03 | | na |
| di-n-butyiphthalate | NA | 3.65E+02 | | na | NA | 1.50E+04 | | na |
| butylbenzylphthalate | ΨZ | 7.30E+02 | | na | NA | 5.00E+05 | | na |
| te | 8.31E-03 | 4.80E-01 | 1.73E-02 | no | 8.66E+01 | 1.00E+04 | 8.66E-03 | no |
| dl-n-octylphthalate | NA | 7.30E+01 | | na | ΝΑ | 1.50E+05 | | na |

Footnotes:

NA = Not applicable

na = Not available because health-based screening value is not available or not applicable because compound was not detected.

NV = No value

Cehronic = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

Cacute = Acute concentration

ATV = Acute toxicity value

Table D-34: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aldehydes, and Acid Gases 200 meter location

| | | 155mr | n propalling | charge DODI | 155mm propelling charge M3 (zone 5), M199 cannon DØDIC: D540 | M199 cannon | | |
|-------------------------------------|------------------------------|--|--------------------------------|----------------|---|---------------------------------|-------------|----------|
| Compound | G _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (μg/m³) | Cacute/ ATV | v 4. |
| PAHs | | | | | | | | |
| acenaphthylene | 6.37E-05 | NV | | na | 2.84E-01 | 2.00E+02 | 1.42E-03 | 2 |
| acenaphthene | NA | 2.19E+02 | | na | NA | 1.25E+03 | | na |
| fluorene | 3.41E-05 | 1.46E+02 | 2.33E-07 | no | 1.52E-01 | 7.50E+04 | 2.03E-06 | OU |
| phenanthrene | 9.85E-05 | N/ | | na | 4.40E-01 | 2.00E+03 | 2.20E-04 | ou |
| anthracene | 1.29E-05 | 1.10E+03 | 1.18E-08 | ou ' | 5.75E-02 | 6.00E+03 | 9.58E-06 | ou |
| fluoranthene | 6.80E-05 | 1.46E+02 | 4.66E-07 | 00 | 3.04E-01 | 3.00E+01 | 1.01E-02 | ou Ou |
| pyrene | 2.07E-04 | 1.10E+02 | 1.89E-06 | no | 9.26E-01 | 1.50E+04 | 6.17E-05 | 92 |
| benzo(a)anthracene | 5.10E-06 | 2.17E-02 | 2.35E-04 | no | 5.32E-02 | 6.00E+02 | 8.86E-05 | ရ |
| chrysene | 5.49E-06 | 2.17E+00 | 2.53E-06 | no | 5.72E-02 | 2.00E+02 | 2.86E-04 | 2 |
| benzo(b)fluoranthene | 9.92E-06 | 2.17E-02 | 4.57E-04 | no | 2.58E-02 | AN | | na |
| benzo(k)fluoranthene | 1.30E-05 | 2.17E-01 | 6.00E-05 | uo | 3.39E-02 | NA | | na |
| benzo(a)pyrene | 1.82E-05 | 2.17E-03 | 8.39E-03 | no | 1.90E-01 | 7.50E+03 | 2.53E-05 | 2 |
| Indeno(1,2,3-cd)pyrene | 2.92E-05 | 2.17E-02 | 1.35E-03 | no | 7.61E-02 | NA | | na |
| dibenz(a,h)anthracene | 9.21E-07 | 2.17E-03 | 4.25E-04 | uo | 9.60E-03 | 3.00E+04 | 3.20E-07 | no |
| benzo(g,h,i)perylene | 1.64E-04 | ≥ | | na | 7.30E-01 | 3.00E+04 | 2.43E-05 | 00 |
| Dioxins / Furans | | | | | | | | |
| 2378-Tetrachlorodibenzo-p-dloxin | 8.40E-10 | 4.48E-08 | 1.87E-02 | no | 8.75E-06 | 3.50E+00 | 2.50E-06 | no |
| 12378-Pentachlorodibenzo-p-dioxin | 2.73E-10 | 2 | | na | 1.22E-06 | 2.50E+00 | 4.87E-07 | no |
| 123478-Hexachlorodibenzo-p-dioxin | ٩٧ | >2 | | na | NA | NA | | na |
| 123678-Hexachlorodibenzo-p-dioxin | 7.92E-10 | Š | | na | 3.54E-06 | 1.50E+01 | 2.36E-07 | 0U |
| 123789-Hexachlorodibenzo-p-dioxin | 1.24E-10 | 1.48E-06 | 8.37E-05 | no | 3.22E-07 | NA | | na |
| 1234678-Heptachlorodibenzo-p-dłoxin | 6.83E-09 | N | | na | 7.63E-06 | NA | | na |
| Octachlorodibenzo-p-dioxin | 3.97E-08 | N | | na | 4.44E-05 | NA | | na |
| 2378-Tetrachlorodibenzo-p-furan | 8.61E-10 | N | | na | 3.85E-06 | 2.00E+00 | 1.92E-06 | no |
| 12378-Pentachlorodibenzo-p-furan | 8.09E-10 | N | | na | 9.03E-07 | NA | | na |
| 23478-Pentachlorodibenzo-o-furan | 3.77E-10 | ≥ | | na | 1.68E-06 | 7.50E-02 | 2.24E-05 | no |
| 123478-Hexachlorodibenzo-p-furan | 6.36E-10 | N | | na | 2.84E-06 | 7.50E+00 | 3.79E-07 | 01 |
| 123789-Hexachlorodibenzo-p-furan | ΝΑ | N < | | na | NA | AN | | na |
| 234678-Hexachlorodibenzo-p-furan | 2.66E-10 | ≥. | | na | 1.19E-06 | 1.50E+00 | 7.90E-07 | 02 |
| 1234678-Heptachlorodibenzo-p-furan | 2.87E-09 | N | | na | 3.20E-06 | NA | | na |
| 1234789-Heptachlorodibenzo-p-furan | 1.34E-10 | N | | na | 1.50E-07 | NA | | na |
| OCDF | 1.81E-09 | N | | na | 2.02E-06 | NA | | na |
| Aldehydes | | | | | | | | |
| Formaldehyde | NA | 1.48E-01 | | na | NA | 1.23E+03 | | na |

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Table D-34: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aldehydes, and Acid Gases

200 meter location

| | | 155mr | n propelling | s charge DODIC | 155mm propelling charge M3 (zone 5), M199 cannon DODIC: D540 | 4199 cannon | | |
|--------------------------|------------------------------|--|--------------------------------|-------------------|---|---------------------------------|-------------|------|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronie} / HBSL | > 1? | С _{асиt} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| Acetaldehyde | ۸۸ | 8.73E-01 | | na | ۸N | 1.80E+04 | | na |
| Acetone | ΝΑ | 3.65E+02 | | na | NA | 2.37E+06 | | na |
| Acrolein | NA | 2.09E-02 | | ua | NA | 2.30E+02 | | na |
| Proprionaldehyde | AN | ۸N | | ua | NA | 7.50E+04 | | na |
| Crotonaldehyde | NA | 3.54E-03 | | eu | AN | 5.72E+03 | | na |
| Butyraldehyde | NA | NV | | , na | NA | 7.38E+04 | | na |
| Benzaldehyde | NA | 3.65E+02 | | eu | NA | 1.50E+04 | | na |
| Isovaleraldehyde | NA | NV | | eu | NA | NA | | na |
| Vateraldehyde | NA | NV | | na | NA | NA | | na |
| o,m,p-Tolualdehyde | NA | NV | | na | AN | NA | | na |
| Hexaldehyde | NA | ۸N | | ua | ۷V | NA | | na |
| 2,5-Dimethylbenzaldehyde | NA | > <u>N</u> | | ВU | ΑN | NA | | na |
| Acid Gases | | | | | | | | |
| Hydrogen fluoride | NA | ۸N | | eu | WA | 1.60E+03 | | na |
| Hydrogen chloride | NA | 2.08E+01 | | na | AN | 4.50E+03 | | na |
| Hydrogen bromide | NA | NV | | ua | NA | 9.93E+03 | | na |
| Nitric Acid | NA | NV | | eu | NA | 5.16E+03 | | па |
| Phosphoric acid | NA | 1.04E+01 | | na | NA | 3.00E+03 | | na |
| Sulfuric Acid | NA | N | | eu | ΝA | 2.00E+03 | | na |
| Eootpoto: | | | | | | | | |

Footnote:

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

Cerronic = Chronic time-averaged concentration; HBSL = Chronic health-based screening level

Cacute = Acute concentration; ATV = Acute toxicity value

Table D-35: Comparison of Air Concentrations With Health-Based Values: Cyanides and Energetics 200 meter location

| 200 meter location | | | | | | | | | |
|---|------------------------------|--|--------------------------------|-----------------|---|---------------------------------|--------------------------|------|---|
| | | 155mn | n propelling | charge DODIC | 155mm propelling charge M3 (zone 5), M199 cannon DODIC: D540 | #199 cannon | | | |
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | C _{acute} / ATV | > 1? | |
| Particulate Cyanide and Hydrogen Cyanide (CN) | | | | | | | | | |
| Particulate Cyanide | 2.78E-02 | 7.30E+01 | 3.81E-04 | no | 1.24E+02 | 5.00E+03 | 2.49E-02 | no | |
| Hydrogen Cyanide | 3.83E-01 | 3.13E+00 | 1.22E-01 | no | 1.71E+03 | 5.17E+03 | 3.30E-01 | no | |
| Energetics | | | | | | | | | |
| Nitrobenzene | ΑN | 2.09E+00 | • | na | NA | 1.51E+04 | | na | |
| 2-Nitrotoluene | NA | 3.65E+01 | | na | NA | NA | | na | |
| 3-Nitrotoluene | NA | 3.65E+01 | | na | NA | NA | | na | |
| 4-Nitrotoluene | ΑN | 3.65E+01 | | na | NA | 3.37E+04 | | na | |
| Nitroglycerine | NA | 4.80E-01 | | na | NA | NA | | na | |
| 1,3-Dinitrobenzene | ΝA | 3.65E-01 | | na | NA | 3.00E+03 | | na | |
| 2,6-Dinitrotoluene | NA | 3.65E+00 | | na | NA | 6.00E+02 | | na | |
| 2,4-Dinitrotoluene | NA | 7.30E+00 | | na | NA | 6.00E+02 | | eu | |
| 1,3,5-Trinitrobenzene | NA | 1.10E+02 | | na | NA | 3.00E+04 | | na | _ |
| 2,4,6-Trinitrotoluene | NA | 2.24E-01 | | na | NA | 2.50E+04 | | na | |
| RDX | NA | 6.11E-02 | | na | NA | NA | | na | _ |
| 4-Amino-2,6-Dinitrotoluene | NA | N | | | AA | NA | | | |
| 2-Amino-4,6-Dinitrotoluene | NA | N N | | | NA | 1.50E+04 | | | |
| Tetryl | NA | 3.65E+01 | | na | NA | NA | | eu | |
| HMX | NA | 1.83E+02 | | eu | NA | NA | | na | _ |
| Pentaerythritoltetranitrate | NA | NV | | na | ΔA | 5.00E+01 | | na | |
| Dibutyl phthalate | NA | 3.65E+02 | | na | ΝΑ | 1.50E+04 | | na | |
| Dioctyl phthalate | NA | 4.80E-01 | | na | NA | 1.00E+04 | | na | |
| Diphenylamine | NA | 9.13E+01 | | na | NA | 3.00E+04 | | na | |
| Footnote: | | | | | | | | | _ |

-ootnote:

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

 $C_{\rm chronic}$ = Chronic time-averaged concentration; HBSL = Chronic health-based screening level $C_{\rm acute}$ = Acute concentration; ATV = Acute (oxicity value)

Table D-36: Comparison of Air Concentrations With Health-Based Values: Total Petroleum Hydrocarbons 200 meter location

| | 4 Kamm | arangilling charge | M2 (Pond E) M100 | a canada |
|--------------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| | | | DODIC: D540 | o camion |
| Compound (a) | C _{chronic} (µg/m³) | C _{chronic} (µg/m³) | C _{chronic} (µg/m³) | C _{chronic} (µg/m³) |
| | Aliphatic:C<=8 | Allphatic:C>8 | Aromatic: C<=8 | Aromatic:C>8 |
| Benzene | NA | NA | 1.71E-02 | NA |
| Toluene | NA | NA | 4.74E-04 | NA |
| naphthalene | NA | YN · | AN | 4.80E-04 |
| acenaphthylene | AN | WA | ΑN | 6.37E-05 |
| acenaphthene | AN | NA | AN | |
| fluorene | NA | NA | NA | 3,41E-05 |
| phenanthrene | NA | AN | AN | 9.85E-05 |
| anthracene | NA | NA | NA | 1.29E-05 |
| Total (µg/m³) | 0.00E+00 | 00+300°0 | 1.76E-02 | 6.89E-04 |
| Derived Health-Based Screening Level | 1.92E+04 | 1.04E+03 | 4.17E+02 | 2.09E+02 |
| C _{chronic} /HBSL | 0.00E+00 | 0.00E+00 | 4.21E-05 | 3.30E-06 |
| >15 | no | no | no | no |
| | | | | |

Footnotes:

>1? = Is the ratio greater than one? NA = Not Applicable because compound was not detected

C_{chronic} = chronic averaged air Concentration (not adjusted for cancer averaging time of 70 years)

HBSL = Health-Based Screening Level

RISK EVALUATION DATA FOR CHARGE M3A1, FIRED FROM THE M199 CANNON, ZONE 3, 100 METERS DOWNWIND

Table D-37: Comparison of Air Concentrations With Health-Based Values: Gases, Particulates and Metals 100 meter location

| | | 155mm | propelling | charge N DoDIC | large M3A1 (zone 3), DoDIC: D540 | 155mm propelling charge M3A1 (zone 3), M199 cannon DODIC: D540 | | |
|-----------------------------------|------------------------------|--|--------------------------------|-------------------|-------------------------------------|--|-------------|---------|
| Compound | С _{chronlc} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronte} / HBSL | > 12 | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| Gases | | | | | | | | |
| NH ₃ | 1.29E+00 | 1.04E+02 | 1.24E-02 | ou | 1.44E+03 | 1.75E+04 | 8.24E-02 | ou |
| Carbon Dioxide (CO ₂) | 2.22E+01 | N N | | na | 9.89E+04 | 5.40E+07 | 1.83E-03 | ou U |
| Carbon Monoxide (CO) | 5.90E+01 | 1.57E+02 | 3.76E-01 | 92 | 6.58E+04 | 2.30E+05 | 2.86E-01 | 02 |
| Nitrogen Oxides (as NO) | NA | 1.00E+02 | | na | AN | 2.70E+05 | | na |
| Methane (CH ₄) | NA | NV | | na | ΝΑ | 3.30E+06 | | na |
| Sulfur Dioxide (SO ₂) | NA | 8.00E+01 | | na | ΑN | 7.89E+02 | | na |
| Combined Particulate | | | | | | | | |
| TSP | 1.89E+00 | 5.00E+01 | 3.78E-02 | ပ | 2.11E+03 | ΑN | | na |
| PM ₁₀ | 1.34E+00 | 5.00E+01 | 2.68E-02 | ou | 1.50E+03 | NA A | | na |
| PM _{2.5} | 7.26E-01 | 1.50E+01 | 4.84E-02 | ou | 8.11E+02 | NA | | na |
| Metals | | | | | | | | |
| Antlmony | NA | 1.46E+00 | | na | NA | 1.50E+03 | | na |
| Arsenic | 1.83E-05 | 4.47E-04 | 4.10E-02 | no | 1.91E-01 | 3.00E+01 | 6.36E-03 | ou |
| Barlum | 9.14E-04 | 5.21E-01 | 1.75E-03 | no | 4.08E+00 | 1.50E+03 | 2.72E-03 | 2 |
| Beryllium | ΝΑ | 8.00E-04 | | na | NA | 5.00E+00 | | na |
| Cadmlum | 1.37E-05 | 1.07E-03 | 1.29E-02 | 92 | 1.43E-01 | 3.00E+01 | 4.77E-03 | on O |
| Chromium | 1.09E-04 | 1.53E-04 | 7.16E-01 | OL | 1.14E+00 | 1.50E+03 | 7.59E-04 | ou |
| Cobalt | 2.24E-05 | 2.20E+02 | 1.02E-07 | 2 | 9.99E-02 | 6.00E+01 | 1.66E-03 | no |
| Copper | 2.49E-01 | 1.46E+02 | 1.71E-03 | no | 1.11E+03 | 3.00E+03 | 3.71E-01 | 2 |
| Lead | 7.34E-03 | 1.50E+00 | 4.89E-03 | п | 3.28E+01 | 1.50E+02 | 2.19E-01 | on O |
| Manganese | 8.14E-04 | 5.11E-02 | 1.59E-02 | ပ | 3.63€+00 | 3.00E+03 | 1.21E-03 | 2 |
| Nickel | 4.45E-10 | 7.30E+01 | 6.10E-12 | no | 1.99E+00 | 3.00E+03 | 6.63E-04 | ဥ |
| Selenium | AN | 1.83E+01 | | na | NA | 6.00E+02 | | na |
| Sliver | 2.00E-11 | 1.83E+01 | 1.10E-12 | OD | 8.94E-02 | 3.00E+02 | 2.98E-04 | ou |
| Thallium | AN | 2.56E-01 | | na | AA | 3.00E+02 | | na |
| Zinc | 5.35E-08 | 1.10E+03 | 4.88E-11 | ou | 2.39E+02 | 3.00E+04 | 7.96E-03 | ou |

Footnote:

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

C_{chronic} = Chronic time-averaged concentration; HBSL = Chronic health-based screening level

Cacute = Acute concentration; ATV = Acute toxicity value

1/16/01

Table D-38: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

| | | 155mm:pro | no Builled | arge M DODIC | arge M3A1 (zone 3), DODIC: D540 | 155mm propelling charge M3A1 (zone 3), M199 cannon DODIC: D540 | * | |
|---------------------------------------|------------------------------|--|------------------------|-----------------|------------------------------------|---|--------------------------|------|
| Compound (a) | С _{сһronіс} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronlc} / | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | C _{acute} / ATV | > 1? |
| VOCs | | | | | | | | |
| Dichlorodifluoromethane | NA | 2.09E+02 | | na | AN | 1.48E+07 | | na |
| Methyl Chloride | NA | 1.07E+00 | | na | AA | 2.06E+05 | | na |
| Dichlorotetrafluoroethane | NA | ΛN | | na | ΑN | NA | | na |
| Vinyl Chloride | NA | 2.20E-02 | • | na | AN | 1.28E+04 | | na |
| 1,3-Butadlene | NA | 3.74E-03 | | na | NA | 2.20E+04 | | na |
| Methyl Bromide | NA | 5.21E+00 | | na | NA | 5.82E+04 | | na |
| Ethyl Chloride | NA | 2.32E+00 | | na | NA | 7.92E+06 | | na |
| Trichlorofluoromethane | NA | 7.30E+02 | | na | NA | 2.81E+06 | | na |
| 1,1-Dichloroethene | 8.86E-04 | 5.21E+02 | 1.70E-06 | uo | 9.90E-01 | 7.92E+04 | 1.25E-05 | 20 |
| Dichloromethane | 3.22E-02 | 4.09E+00 | 7.88E-03 | ou | 8.39E+01 | 6.96E+05 | 1.21E-04 | ou |
| 3-Chloropropene | NA | 1.04E+00 | | na | NA | 9.39E+03 | | na |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | NA | 3.13E+04 | | na | NA | 9.58E+06 | | na |
| 1,1-Dichloroethane | NA | 5.21E+02 | | na | NA | 1.21E+06 | | na |
| cls-1,2-Dichloroethene | NA | 3.65E+01 | | na | AN | 7.92E+05 | | na |
| Trichloromethane | A A | 8.35E-02 | | na | NA | 9.76E+03 | | na |
| 1,2-Dichloroethane | NA | 7.39E-02 | | na | NA | 8.08E+03 | | na |
| 1,1,1-Trichloroethane | NA | 1.04E+03 | | na | NA | 1.94E+06 | | na |
| Вепzепе | 9.30E-03 | 2.49E-01 | 3.73E-02 | no | 2.42E+01 | 1.56E+05 | 1.55E-04 | no |
| Carbon Tetrachloride | NA | 1.28E-01 | | na | ΝΑ | 1.28E+05 | | na |
| 1,2-Dichloropropane | NA | 9.89E-02 | | na | ΑΝ | 5.08E+05 | | na |
| Trichloroethene | NA | 1.12E+00 | | na | NA | 5.38E+05 | | na |
| cis-1,3-Dichloropropene | NA | 5.17E-02 | | na | ΑΝ | 1.14E+04 | | na |
| trans-1,3-Dichloropropene | NA | 5.17E-02 | | na | NA | NA | | na |
| 1,1,2-Trichloroethane | NA | 1.20E-01 | | na | NA | 1.64E+05 | | na |
| Toluene | 1.06E-03 | 4.02E+02 | 2.64E-06 | 2 | 1.18E+00 | 1.88E+05 | 6.31E-06 | no |
| 1,2-Dibromoethane | NA | 8.73E-03 | | na | ΑΝ | 1.54E+05 | | na |
| Tetrachloroethene | NA | 3.31E+00 | | na | NA | 6.78E+05 | | na |
| Chlorobenzene | NA | 6.21E+01 | | na | Ϋ́ | 1.38E+05 | | na |
| Ethylbenzene | NA | 1.06E+03 | | na | Ϋ́ | 5.43E+05 | | na |
| m&p-Xylene | NA NA | 7.30E+02 | | na | NA | 6.51E+05 | | na |

Table D-38: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

100 meter location

| | | 155mm pro | opelling c | large N | 3A1 (zone 3). | 155mm propelling charge M3A1 (zone 3). M199 cannon | | | _ |
|---------------------------|------------------------------|--|--------------------------------|---------|----------------------------|--|-------------|-------------|----|
| | | | | DODIC | DODIC: D540 | | • | | |
| Compound (a) | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | ^ 12 | |
| | ΝΑ | 1.06E+03 | | na | ΑN | 2.13E+05 | | na | _ |
| 1,1,2,2-Tetrachloroethane | ΑN | 3.31E-02 | | na | AN | 2.06E+04 | | na | |
| | NA | 7.30E+02 | | na | ΝΑ | 6.51E+05 | | na | |
| 4-Ethyltoluene | AN | ۸N | | na | Ą | 1.25E+05 | | na | |
| 1,3,5-Trimethylbenzene | NA | 6.21E+00 | • | na | ΑN | 3.68E+05 | | na | |
| 1,2,4-Trimethylbenzene | NA | 6.21E+00 | | na | ΝΑ | 1.80E+05 | | na | _ |
| Benzyl Chloride | NA | 3.96E-02 | | na | Ą | 5.20E+03 | | na | |
| m-Dichlorobenzene | NA | 3.29E+00 | | na | ΨN | 3.61E+04 | | na | |
| p-Dichlorobenzene | ΝA | 3.06E-01 | | na | ΑN | 6.61E+05 | | na | _ |
| o-Dichlorobenzene | AN | 2.09E+02 | | na | ΑN | 3.01E+05 | | na | - |
| 1,2,4-Trichlorobenzene | NA | 2.08E+02 | | na | ۷A | 3.71E+04 | | na | |
| Hexachlorobutadiene | NA | 8.62E-02 | | na | ΑN | 3.21E+04 | | na | - |
| Hydrocarbons | | | | | | | | | |
| Methane | 3.15E-01 | N | | na | 1.41E+03 | 3.30E+06 | 4.27E-04 | 2 | |
| Ethane | NA | NN | | na | ΑN | NA | | na | |
| Ethylene | ΑN | ۸N | | na | Ą | 4.60E+05 | | na | _ |
| Propane | NA | NN | | na | ΑN | 3.78E+06 | | na | |
| Acetylene | NA | NV | | na | ΝΑ | NA | | na | |
| Isobutane | NA | NV | | na | NA | 9.52E+05 | | na | ~- |
| n-Butane | NA | NV | | na | NA | 5.71E+06 | | na | _ |
| Propylene | ΑN | λN | | na | ΑN | NA | | na | _ |
| | | | | | | | | | • |

Footnotes:

NA = Not applicable

na = Not available because health-based screening value is not available or not applicable because compound was not detected.

NV = No value

Cehronic = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

C_{acute} = Acute concentration

ATV = Acute toxicity value

Table D-39: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

| TOO HEALEN TOCATION | | | | | | 4277 | | |
|-----------------------------|------------------------------|--|--------------------------------|------------------------------|----------------------------|---|-------------|------|
| | | 155mm pr | opelling dr | large M3A1 (z DODIC: D540 | 13A1 (zone 3), : D540 | 155mm propelling charge M3A1 (zone 3), M199 cannon DODIC: D540 | | |
| Compound | С _{енгопіс} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (μg/m³) | Cacute/ ATV | > 1? |
| SVOCS | | | | | | | | |
| n-nitrosodimethylamine | NA | 1.37E-04 | | na | NA | 2.50E+03 | | na |
| bis(2-chloroethyl)ether | ΝΑ | 5.82E-03 | | na | NA | 5.85E+04 | | na |
| phenol | 5.10E-03 | 2.19E+03 | 2.33E-06 | no | 2.28E+01 | 3.85E+04 | 5.92E-04 | no |
| 2-chlorophenol | ΝΑ | 1.83E+01 | | na | NA | 5.25E+03 | | na |
| 1,3-dichlorobenzene | NA | 3.29E+00 | | na | NA | 3.61E+04 | | na |
| 1,4-dichlorobenzene | ٩N | 3.06E-01 | | na | NA | 6.61E+05 | | na |
| 1,2-dichlorobenzene | ΑN | 2.09E+02 | | na | NA | 3,01E+05 | | na |
| benzyl alcohol | NA | 1.10E+03 | | na | NA | 5.53E+04 | | na |
| bis(2-chloroisopropyl)ether | NA | 1.92E-01 | | na | NA | 6.99E+04 | | na |
| 2-methylphenol | AN | 1.83E+02 | | na | NA | NA | | na |
| hexachloroethane | AN | 4.80E-01 | | na | NA | 2.90E+04 | | na |
| n-nitroso-di-n-propylamine | ΝΑ | 9.61E-04 | | па | ΑΝ | 2.00E+02 | | na |
| 4-methylphenol | AN | 1.83E+02 | | na | AN | NA | | na |
| nitrobenzene | NA | 2.09E+00 | | na | NA | 1.51E+04 | | na |
| isophorone | NA | 7.08E+00 | | na | NA | 2.83E+04 | | na |
| 2-nitrophenol | NA | NV | | na | NA | NA | | na |
| 2,4-dimethylphenol | NA | 7.30E+01 | | na | NA | ΑΝ | | na |
| bis(2-chloroethoxy)methane | NA | NV | | na | NA | NA | | na |
| 2,4-dichlorophenol | NA | 1.10E+01 | | na | NA | 3.00E+04 | | na |
| 1,2,4-trichlorobenzene | NA | 2.08E+02 | | na | NA | 3.71E+04 | | na |
| naphthalene | 1.09E-03 | 3.13E+00 | 3.50E-04 | 9 | 4.88E+00 | 7.86E+04 | 6.21E-05 | 01 |
| 4-chloroaniline | NA | 1.46E+01 | | na | NA | 3.00E+04 | | na |
| hexachlorobutadiene | NA | 8.62E-02 | | na | AA | 3.21E+04 | | na |
| 4-chloro-3-methylphenol | NA | >N | | na | NA | 2.00E+04 | | na |
| 2-methylnaphthalene | NA | 7.30E+01 | | na | NA A | 2.00E+04 | | na |
| hexachlorocyclopentadlene | NA | 7.30E-02 | | na | NA | 2.23E+02 | | na |
| 2,4,6-trichlorophenol | NA | 1.10E+02 | | na | NA | NA | | na |
| 2,4,5-trichlorophenol | NA | 3.65E+02 | | na | NA | 3.00E+04 | | na |
| 2-chloronaphthalene | NA | 2.92E+02 | | na | NA | 6.00E+02 | | na |
| 2-nkroaniline | AN | 2.09E-01 | | na | NA | NA | | na |
| dimethylphthalate | NA | 3.65E+04 | | na | NA | 1.50E+04 | | na |
| 2,6-dinitrotoluene | NA | 3.65E+00 | | na | NA | 6.00E+02 | | na |

Table D-39: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds 100 meter location

| | | 155mm pr | p gullledo | rarge N DODIC | arge M3A1 (zone 3), DODIC: D540 | 155mm propelling charge M3A1 (zone 3), M199 cannon DODIC: D540 | | |
|--------------------------------------|------------------------------|--|--------------------------------|------------------|------------------------------------|---|-------------|------|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 1? |
| 3-nitroaniline | ΑN | ΛN | | na | NA | 9.00E+03 | | na |
| 2,4-dinitrophenol | NA | 7.30E+00 | | na | NA | 7.50E+03 | | na |
| dibenzofuran | NA | 1.46E+01 | | na | NA | NA NA | | na |
| 2,4-dinitrotoluene | NA | 7.30E+00 | | na | NA | 6.00E+02 | | na |
| 4-nitrophenol | NA | 2.92E+01 | | na | NA | 3.00E+04 | | na |
| 4-chlorophenyl-phenylether | NA | N/ | | na | ΝA | ΝΑ | | na |
| diethylphthalate | NA | 2.92E+03 | | na | NA | 1.50E+04 | | na |
| 4-nitroaniline | AN | /N | | na | NA | 9.00E+03 | | na |
| 4,6-dinitro-2-methylphenol | AN | 3.65E-01 | | na | NA | 5.00E+02 | | na |
| n-nitrosodiphenylamine(1) | NA | 1.37E+00 | | na | NA | ΝΑ | | na |
| 4-bromophenyl-phenylether | NA | ۸N | | na | NA | NA | | na |
| hexachlorobenzene | NA | 4.18E-03 | | na | AN | 7.50E+01 | | na |
| pentachlorophenol | NA | 5.60E-02 | | na | NA | 1.50E+03 | | na |
| di-n-butyiphthalate | NA | 3.65E+02 | | na | NA | 1.50E+04 | | na |
| butylbenzylphthalate | NA | 7.30E+02 | | na | NA | 5.00E+05 | | na |
| bis(2-ethylhexyl)phthalate | AN | 4.80E-01 | | na | NA | 1.00E+04 | | na |
| di-n-octylphthalate | AN | 7.30E+01 | | na | NA | 1.50E+05 | | na |
| | | | | | | | | |

Footnotes:

NA = Not applicable na = Not available because health-based screening value is not available or not applicable because compound was not detected. NV = No value

C_{chronic} = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

C_{acule} = Acute concentration

ATV = Acute toxicity value

Table D-40: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aidehydes, and Acid Gases

| | | 155mm | propelling (| Harge I | arge M3A1 (zone 3) DODIC: D540 | 155mm propelling charge M3A1 (zone 3), M199 cannon bodic: D540 | | |
|-------------------------------------|------------------------------|--|--------------------------------|---------|-----------------------------------|--|-------------|------|
| Compound | C _{ehronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 12 | С _{асиіе} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 13 |
| PAHS | | | | | | | | |
| acenaphthylene | 1.80E-04 | N | | na | 8.04E-01 | 2.00E+02 | 4.02E-03 | no |
| acenaphthene | 2.03E-05 | 2.19E+02 | 9.27E-08 | no | 9.07E-02 | 1.25E+03 | 7.25E-05 | 200 |
| fluorene | 7.06E-05 | 1.46E+02 | 4.84E-07 | no | 3.15E-01 | 7.50E+04 | 4.20E-06 | no |
| phenanthrene | 1.21E-04 | NV | | na | 5.40E-01 | 2.00E+03 | 2.70E-04 | no |
| anthracene | 1.49E-05 | 1.10E+03 | 1.36E-08 | no, | 6.65E-02 | 6.00E+03 | 1.11E-05 | 2 |
| fluoranthene | 6.69E-05 | 1.46E+02 | 4.58E-07 | no | 2.99E-01 | 3.00E+01 | 9.96E-03 | no |
| pyrene | 1.61E-04 | 1.10E+02 | 1.47E-06 | no | 7.18E-01 | 1.50E+04 | 4.79E-05 | 20 |
| benzo(a)anthracene | 3.87E-06 | 2.17E-02 | 1.79E-04 | no | 4.04E-02 | 6.00E+02 | 6.73E-05 | ПО |
| chrysene | 4.73E-06 | 2.17E+00 | 2.18E-06 | no | 4.92E-02 | 2.00E+02 | 2.46E-04 | no |
| benzo(b)fluoranthene | 1.38E-05 | 2.17E-02 | 6.35E-04 | no | 3.59E-02 | AN | | na |
| benzo(k)fluoranthene | 90-306'8 | 2.17E-01 | 4.10E-05 | no | 2.32E-02 | AN | | na |
| benzo(a)pyrene | 1.76E-05 | 2.17E-03 | 8.11E-03 | no | 1.83E-01 | 7.50E+03 | 2.45E-05 | DD. |
| Indeno(1,2,3-cd)pyrene | 3.14E-05 | 2.17E-02 | 1.45E-03 | no | 8.19E-02 | NA | | na |
| dibenz(a,h)anthracene | 6.85E-07 | 2.17E-03 | 4.54E-04 | no | 1.03E-02 | 3.00E+04 | 3.42E-07 | 2 |
| benzo(g,h,l)perylene | 1.43E-04 | NN | | na | 6.41E-01 | 3.00E+04 | 2.14E-05 | no |
| Dioxins / Furans | | | | | | | | |
| 2378-Tetrachlorodibenzo-p-dloxin | WA | 4.48E-08 | | na | NA | 3.50E+00 | | na |
| 12378-Pentachlorodibenzo-p-dloxin | 1.23E-10 | ≥ | | na | 5.50E-07 | 2.50E+00 | 2.20E-07 | no |
| 123478-Hexachlorodibenzo-p-dioxin | NA | NV | | na | NA | NA | | na |
| 123678-Hexachlorodibenzo-p-dioxin | 3.50E-10 | N | | na | 1.56E-06 | 1.50E+01 | 1.04E-07 | no |
| 123789-Hexachlorodibenzo-p-dioxin | 1.69E-10 | 1.48E-06 | 1.14E-04 | no | 4.39E-07 | NA | | na |
| 1234678-Heptachlorodibenzo-p-dioxin | 3.50E-09 | N | | na | 3.90E-06 | NA | | na |
| Octachlorodibenzo-p-dloxin | 1.37E-08 | ≥ | | па | 1.53E-05 | NA | | na |
| 2378-Tetrachlorodibenzo-p-furan | NA | N | | na | NA | 2.00E+00 | | na |
| 12378-Pentachlorodibenzo-p-furan | NA | N | | na | NA | NA | | na |
| 23478-Pentachlorodibenzo-o-furan | NA | NV | | na | NA | 7.50E-02 | | na |
| 123478-Hexachlorodibenzo-p-furan | 6.25E-11 | NV | | na | 2.79E-07 | 7.50E+00 | 3.72E-08 | ou |
| 123789-Hexachlorodibenzo-p-furan | NA | NV | | na | NA | , NA | | na |
| 234678-Hexachlorodibenzo-p-furan | ΝΑ | N | | na | ΝΑ | 1.50E+00 | | na |
| 1234678-Heptachlorodibenzo-p-furan | 2.30E-10 | N | | na | 2.57E-07 | . NA | | na |
| 1234789-Heptachlorodibenzo-p-furan | NA | N | | na | NA | NA | | na |
| OCDF | 4.55E-10 | NV | | na | 5.08E-07 | NA | | na |
| Aldehydes | | | | | | | | |
| Formaldehyde | NA | 1.48E-01 | | na | NA | 1.23E+03 | | na |

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Table D-40: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aldehydes, and Acid Gases 100 meter location

| | | 155mm | propelling | charge I | arge M3A1 (zone 3), DODIC: D540 | 155mm propelling charge M3A1 (zone 3), M199 cannon DODIC: D540 | | |
|--------------------------|------------------------------|--|--------------------------------|----------|------------------------------------|---|-------------|------|
| Compound | С _{сһґопіс} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | С _{асиtе} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| Acetaldehyde | AN | 8.73E-01 | | na | ΑN | 1.80E+04 | | na |
| Acetone | AN | 3.65E+02 | | na | AN | 2.37E+06 | | na |
| Acrolein | ۷N | 2.09E-02 | | eu | NA | 2.30E+02 | | na |
| Proprionaldehyde | ۷V | ۸N | | na | ۷N | 7.50E+04 | | na |
| Crotonaldehyde | ۷N | 3.54E-03 | | na | NA | 5.72E+03 | | na |
| Butyraldehyde | ۷N | N/ | | eu ' | NA | 7.38E+04 | | na |
| Benzaldehyde | ۷V | 3.65E+02 | | na | AN | 1.50E+04 | | na |
| Isovaleraldehyde | NA | N< | | na | NA | AN | | na |
| Valeraldehyde | AN | NV | | na | NA | AN | | na |
| o,m,p-Tolualdehyde | NA | N | | na | AN | AN | | na |
| Hexaldehyde | AN | NN | | ua | AN | NA | | na |
| 2,5-Dimethylbenzaldehyde | ۷N | NN | | na | NA | NA | | na |
| Acid Gases | | | | | | | | |
| Hydrogen fluoride | VN | ΛN | | na | NA | 1.60E+03 | | na |
| Hydrogen chloride | NA | 2.08E+01 | | na | NA | 4.50E+03 | | na |
| Hydrogen bromide | NA | NV | | na | NA | 8.93E+03 | | na |
| Nitric Acid | NA | N< | | na | NA | 5.16E+03 | | na |
| Phosphoric acid | NA | 1.04E+01 | | na | NA | 3.00E+03 | | na |
| Sulfuric Acid | NA | N | | na | NA | 2.00E+03 | | na |

Footnote:

NA = Not applicable because compound was not detected.

na = Not avallable because health-based screening value is not available or not applicable if compound was not detected.

NV = No value $C_{CHICMIC}$ = Chronic time-averaged concentration ; HBSL = Chronic health-based screening level

C_{acute} = Acute concentration; ATV = Acute toxicity value

Table D-41: Comparison of Air Concentrations With Health-Based Values: Cyanides and Energetics

| 100 meter location | | | | | | | | |
|--|------------------------------|--|--------------------------------|-------------------|------------------------------------|---|-------------|------|
| | | 155mm | propelling | charge h DODIC | arge M3A1 (zone 3), DODIC: D540 | 155mm propelling charge M3A1 (zone 3), M199 cannon DODIC: D540 | | |
| Compound | С _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronlc} / HBSL | > 17 | С _{асиіе} (µg/m³) | Acute Toxicity Value (μg/m³) | Gecute/ ATV | > 1? |
| Particulate Cyanide and Hydrogen Cyanide (CN) | | | | | | | | |
| Particulate Cyanide | NA | 7.30E+01 | | na | NA | 5.00E+03 | | na |
| Hydrogen Cyanide | 1.40E-01 | 3.13E+00 | 4.47E-02 | no | 6.24E+02 | 5.17E+03 | 1.21E-01 | no |
| Energetics | - | | | | | | | |
| Nitrobenzene | NA | 2.09E+00 | • | na | ۸A | 1.51E+04 | | na |
| 2-Nitrotoluene | NA | 3.65E+01 | | na | NA | NA | | na |
| 3-Nitrotoluene | NA | 3.65E+01 | | na | NA | NA | | na |
| 4-Nitrotoluene | NA | 3.65E+01 | | na | NA | 3.37E+04 | | na |
| Nitroglycerine | AN | 4.80E-01 | | na | NA | NA | | na |
| 1,3-Dinitrobenzene | AN | 3.65E-01 | | na | NA | 3.00E+03 | | na |
| 2,6-Dinitrotoluene | NA | 3.65E+00 | | na | NA | 6.00E+02 | | na |
| 2,4-Dinitrotoluene | NA | 7.30E+00 | | na | NA | 6.00E+02 | | na |
| 1,3,5-Trinitrobenzene | NA | 1.10E+02 | | na | NA | 3.00E+04 | | na |
| 2,4,6-Trinitrotoluene | NA | 2.24E-01 | | na | NA | 2.50E+04 | | na |
| RDX | NA | 6.11E-02 | | na | NA | NA | | na |
| 4-Amino-2,8-Dinitrotoluene | NA | N | | | NA | NA | | |
| 2-Amino-4,6-Dinitrotoluene | NA | NV | | | NA | 1.50E+04 | | |
| Tetryi | NA | 3.65E+01 | | na | NA | NA | | na |
| HMX | NA | 1.83E+02 | | па | NA | NA | | na |
| Pentaerythritoltetranitrate | NA | N | | na | NA | 5.00E+01 | | na |
| Dibutyl phthalate | NA | 3.65E+02 | | na | NA | 1.50E+04 | | na |
| Dioctyl phthalate | NA | 4.80E-01 | | na | ΑΝ | 1.00E+04 | | na |
| Diphenylamine | NA | 9.13E+01 | | na | NA | 3.00E+04 | | na |
| Contracto: | | | | | | | | |

Footnote:

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

C_{chronic} = Chronic time-averaged concentration; HBSL = Chronic health-based screening level

Cacule = Acute concentration; ATV = Acute toxicity value

Table D-42: Comparison of Air Concentrations With Health-Based Values: Total Petroleum Hydrocarbons 100 meter location

| 100 High location | | | | |
|--|--|---|---------------------------------------|------------------|
| | 155mm pi | 155mm propelling charge M3A1 (zone 3), M199 cannon DODIC: D540 | arge M3A1 (zone 3), M1 DODIC: D540 | 99 cannon |
| Compound (a) | C _{chronic} (µg/m³) | C _{chronic} (µg/m³) | C _{chronic} (µg/m³) | Cehronic (µg/m³) |
| | Allphatic:C<=8 | Allphatic:C>8 | Aromatic:C<=8 | Aromatic:C>8 |
| Benzene | NA | NA | 2.17E-02 | NA |
| Toluene | NA | NA | 1.06E-03 | NA |
| naphthalene | NA | · NA | NA | 1.09E-03 |
| acenaphthylene | NA | NA | AN | 1.80E-04 |
| acenaphthene | NA | NA | NA | 2.03E-05 |
| fluorene | NA | NA | AN | 7.06E-05 |
| phenanthrene | NA | NA | AN | 1.21E-04 |
| anthracene | NA | NA | NA | 1.49E-05 |
| Total (µg/m³) | 0.00E+00 | 0.00E+00 | 2.27E-02 | 1.50E-03 |
| Derived Health-Based Screening Level | 1.92E+04 | 1.04E+03 | 4.17E+02 | 2.09E+02 |
| C _{chronlc} /HBSL | 0.00E+00 | 0.00E+00 | 5.45E-05 | 7.19E-06 |
| >1? | no | no | no | OU |
| Footnotes: | | | | |
| >1? = Is the ratio greater than one? | | | | |
| NA = Not Applicable because compound was not detected | ected | | | |
| C _{chronic} = chronic averaged air Concentration (not adjus | (not adjusted for cancer averaging time of 70 years) | ling time of 70 years) | | |
| HRS1 = Health-Resed Screening Level | | | | |

HBSL = Health-Based Screening Level

RISK EVALUATION DATA FOR CHARGE M3A1, FIRED FROM THE M199 CANNON, ZONE 3, 200 METERS DOWNWIND

Table D-43: Comparison of Air Concentrations With Health-Based Values: Gases, Particulates and Metals 200 meter location

| AND MIGRAL INCARIOL | | | | | | | | |
|-----------------------------------|------------------------------|--|--------------------------------|-----|--|---------------------------------|-------------|---------|
| | | losmm | propelling | | 155mm propelling charge M3A1 (zone 3), M199 cannon | M199 cannon | | |
| Compound | С _{сhronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | >17 | Gacute (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | >15 |
| Gases | | | | | | | | |
| NH ₃ | 6.19E-01 | 1.04E+02 | 5.93E-03 | ou | 6.91E+02 | 1.75E+04 | 3.95E-02 | 92 |
| Carbon Dloxide (CO ₂) | 1.06E+01 | /N | | na | 4.74E+04 | 5.40E+07 | 8.77E-04 | 2 |
| Carbon Monoxide (CO) | 2.82E+01 | 1.57E+02 | 1.80E-01 | no | 3.15E+04 | 2.30E+05 | 1.37E-01 | 2 |
| Nitrogen Oxides (as NO) | ΝΑ | 1.00E+02 | | na | AN | 2.70E+05 | | na |
| Methane (CH ₄) | NA | NV | | na | AN | 3.30E+06 | | na |
| Sulfur Dloxide (SO ₂) | NA | 8.00E+01 | | na | NA | 7.89E+02 | | na |
| Combined Particulate | | | | | | | | |
| TSP | 9.04E-01 | 5.00E+01 | 1.81E-02 | 2 | 1.01E+03 | NA | | na |
| PM ₁₀ | 6.42E-01 | 5.00E+01 | 1.28E-02 | 2 | 7.17E+02 | ΑN | | g |
| PM _{2.5} | 3.48E-01 | 1.50E+01 | 2.32E-02 | 2 | 3.88E+02 | AN | | na |
| Metals | | | | | | | | |
| Antimony | NA | 1.46E+00 | · | na | ΑN | 1.50E+03 | | na |
| Arsenic | 8.77E-06 | 4.47E-04 | 1.96E-02 | ou | 9.13E-02 | 3.00E+01 | 3.04E-03 | ou |
| Barlum | 4.37E-04 | 5.21E-01 | 8.39E-04 | no | 1.95E+00 | 1.50E+03 | 1.30E-03 | 92 |
| Beryllum | NA | 8.00E-04 | | na | NA | 5.00E+00 | | na |
| Cadmium | 6.57E-06 | 1.07E-03 | 6.16E-03 | 2 | 6.85E-02 | 3.00E+01 | 2.28E-03 | 92 |
| Chromium | 5.23E-05 | 1.53E-04 | 3.43E-01 | 2 | 5.45E-01 | 1.50E+03 | 3.63E-04 | uo |
| Cobalt | 1.07E-05 | 2.20E+02 | 4.87E-08 | 2 | 4.78E-02 | 6.00E+01 | 7.97E-04 | no |
| Copper | 1.19E-01 | 1.46E+02 | 8.17E-04 | 20 | 5.33E+02 | 3.00E+03 | 1.78E-01 | 01 |
| Lead | 3.51E-03 | 1.50E+00 | 2.34E-03 | 2 | 1.57E+01 | 1.50E+02 | 1.05E-01 | 0 |
| Manganese | 3.90E-04 | 5.11E-02 | 7.62E-03 | 20 | 1.74E+00 | 3.00E+03 | 5.80E-04 | ou |
| Nickel | 2.13E-10 | 7.30E+01 | 2.92E-12 | ក | 9.52E-01 | 3.00E+03 | 3.17E-04 | ог С |
| Selenium | NA | 1.83E+01 | | na | AN | 6.00E+02 | | na |
| Silver | 9.58E-12 | 1.83E+01 | 5.25E-13 | 2 | 4.28E-02 | 3.00E+02 | 1.43E-04 | on |
| Thallium | NA NA | 2.56E-01 | | na | NA | 3.00E+02 | | na |
| Zinc | 2.56E-08 | 1.10E+03 | 2.34E-11 | 2 | 1.14E+02 | 3.00E+04 | 3.81E-03 | no |
| Footnote: | | | | | | | | |

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

 $C_{chronic} = Chronic time-averaged concentration; HBSL = Chronic health-based screening level <math>C_{acute} = Acute concentration; ATV = Acute toxicity value$

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Table D-44: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds 200 meter location

| ZUU MBION IOCANON | | - Annah de A | | | | | | |
|---------------------------------------|------------------------------|---|--------------------------------|-----------------------------|----------------------------|---|--------------------------|------|
| | | 165mm pro | | arge M3A1 (2 BODIC: D540 | 3A1 (zone 3), : D540 | 155mm propelling charge M8A1 (zone 3), M199 cannon DODIC: D540 | | |
| Compound (a) | С _{сhronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronte} / HBSL | > 1? | С _{асиtе} (µg/m³) | Acute Toxicity Value (µg/m³) | C _{acute} / ATV | > 1? |
| VOCs | | | | | | | | |
| Dichlorodifluoromethane | AN | 2.09E+02 | | na | NA | 1.48E+07 | | na |
| Methyl Chloride | ĀN | 1.07E+00 | | na | NA. | 2.06E+05 | | na |
| Dichlorotetrafluoroethane | AN | N | | ua | NA | ۷A | | na |
| Vinyl Chloride | Ā | 2.20E-02 | • | na | NA | 1.28E+04 | | na |
| 1,3-Butadlene | ΑN | 3.74E-03 | | na | NA | 2.20E+04 | | na |
| Methyl Bromide | AN | 5.21E+00 | | na | NA | 5.82E+04 | | na |
| Ethyl Chloride | ΑN | 2.32E+00 | | na | NA | 7.92E+06 | | na |
| Trichlorofluoromethane | AN | 7.30E+02 | | na | NA | 2.81E+06 | | na |
| 1,1-Dichloroethene | 4.24E-04 | 5.21E+02 | 8.14E-07 | ou | 4.74E-01 | 7.92E+04 | 5.98E-06 | no |
| Dichloromethane | 1.54E-02 | 4.09E+00 | 3.77E-03 | ou | 4.02E+01 | 6.96E+05 | 5.77E-05 | no |
| 3-Chloropropene | AN | 1.04E+00 | | na | NA | 9.39E+03 | | na |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ΑN | 3.13E+04 | | na | NA | 9.58E+06 | | na |
| 1,1-Dichloroethane | ΑN | 5.21E+02 | | na | NA | 1.21E+06 | | na |
| cis-1,2-Dichloroethene | ΑN | 3.65E+01 | | na | NA | 7.92E+05 | | na |
| Trichloromethane | ¥ | 8.35E-02 | | na | NA | 9.76E+03 | | na |
| 1,2-Dichloroethane | ΑN | 7.39E-02 | | na | NA | 8.08E+03 | | na |
| 1,1,1-Trichloroethane | ۸A | 1.04E+03 | | na | NA | 1.94E+06 | | na |
| Benzene | 4.45E-03 | 2.49E-01 | 1.79E-02 | on | 1.16E+01 | 1.56E+05 | 7.43E-05 | no |
| Carbon Tetrachloride | NA | 1.28E-01 | | na | NA A | 1.28E+05 | | na |
| 1,2-Dichloropropane | NA | 9.89E-02 | | na | A'A | 5.08E+05 | | na |
| Trichtoroethene | AN | 1.12E+00 | | na | NA | 5.38E+05 | | na |
| cis-1,3-Dichloropropene | AN | 5.17E-02 | | na | ΑĀ | 1.14E+04 | | na |
| trans-1,3-Dichloropropene | NA | 5.17E-02 | | na | A A | AN | | na |
| 1,1,2-Trichloroethane | NA | 1.20E-01 | | na | Ā | 1.64E+05 | | па |
| Toluene | 5.07E-04 | 4.02E+02 | 1.26E-06 | no | 5.66E-01 | 1.88E+05 | 3.02E-06 | 2 |
| 1,2-Dibromoethane | NA | 8.73E-03 | | na | AA | 1.54E+05 | | na |
| Tetrachloroethene | NA | 3.31E+00 | | na | Ϋ́ | 6.78E+05 | | na |
| Chlorobenzene : , | NA | 6.21E+01 | | na | ۷Ą | 1.38E+05 | | na |
| Ethylbenzene | NA | 1.06E+03 | | na | ΑN | 5.43E+05 | | na |
| m&p-Xylene | NA | 7.30E+02 | | na | AN | 6.51E+05 | | na |

Table D-44: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds 200 meter location

| | | and the second s | | | | Apply 11 a market and a second | | |
|---------------------------|------------------------------|--|--------------------------------|--------|------------------------------------|---|--------------------------|------|
| | | | ipelling ch | arge.N | arge M3A1 (zone 3), Dobić: D540 | 155mm.propelling.charge M3A1 (zone 3), M199 cannon Dobid: p540 | | |
| Compound (a) | C _{chronic} (µg/m³) | Health-Based Screening Level (μg/m³) | C _{chronic} / HBSL | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | C _{acute} / ATV | > 1? |
| Styrene | AN | 1.06E+03 | | па | ΑN | 2.13E+05 | | na |
| 1,1,2,2-Tetrachloroethane | ΑN | 3.31E-02 | | Б | AN | 2.06E+04 | | na |
| o-Xylene | NA | 7.30E+02 | | na | AN | 6.51E+05 | | na |
| 4-Ethyltoluene | NA | NV | | na | NA | 1.25E+05 | | na |
| 1,3,5-Trimethylbenzene | AN | 6.21E+00 | | na | NA | 3.68E+05 | | na |
| 1,2,4-Trimethylbenzene | NA | 6.21E+00 | | na | NA | 1.80E+05 | | na |
| Benzyl Chloride | NA | 3.96E-02 | | na | AN | 5.20E+03 | | na |
| m-Dichlorobenzene | NA | 3.29E+00 | | na | NA | 3.61E+04 | | na |
| p-Dichlorobenzene | NA | 3.06E-01 | | na | NA | 6.61E+05 | | na |
| o-Dichlorobenzene | NA | 2.09E+02 | | na | ΑN | 3.01E+05 | | na |
| 1,2,4-Trichlorobenzene | NA | 2.08E+02 | | na | ΝΑ | 3.71E+04 | | na |
| Hexachlorobutadiene | NA | 8.62E-02 | | na | ΨN | 3.21E+04 | | na |
| Hydrocarbons | | | | | | | | |
| Methane | 1.51E-01 | NN | | na | 6.74E+02 | 3.30E+06 | 2.04E-04 | 2 |
| Ethane | NA | NN | | na | AN | AN | | na |
| Ethylene | NA | NV | | na | ΝΑ | 4.60E+05 | | na |
| Propane | NA | NV | | na | ۸ | 3.78E+06 | | na |
| Acetylene | NA | NV | | na | ΝΑ | AA | | na |
| Isobutane | NA | NV | | na | AN | 9.52E+05 | | na |
| n-Butane | NA | Ş | | na | NA | 5.71E+06 | | na |
| Propylene | NA | ⋛ | | na | ۸A | NA | | na |
| optopoe. | | | | | | | | |

Footnotes:

NA = Not applicable

na = Not available because health-based screening value is not available or not applicable because compound was not detected.

NV = No value

C_{chronic} = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

Cacute = Acute concentration

ATV = Acute toxicity value

Table D-45: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds 200 meter location

| | | THE WAY AND | S Rullian | M. B. W. | A Inches | JESEMM BYONALINA CHREAS M3 61 7 John 31 M799 Cannon | | |
|-----------------------------|------------------------------|--|--------------------------------|----------|----------------------------|---|-------------|-----|
| | | | | oggic | DODIC: 0540 | | | |
| Compound | С _{сhronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronlc} / HBSL | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | >12 |
| SVOCS | | | | | | | | |
| n-nitrosodimethylamine | NA | 1.37E-04 | | na | NA | 2.50E+03 | | na |
| bis(2-chloroethyl)ether | ۸A | 5.82E-03 | | na | NA | 5.85E+04 | | na |
| phenol | 2.44E-03 | 2.19E+03 | 1.12E-06 | no | 1.09E+01 | 3.85E+04 | 2.83E-04 | no |
| 2-chlorophenol | ۸A | 1.83E+01 | | na | NA | 5.25E+03 | | na |
| 1,3-dichlorobenzene | AN | 3.29E+00 | | na | NA | 3.61E+04 | | na |
| 1,4-dichlorobenzene | AN | 3.06E-01 | | na | NA | 6.61E+05 | | na |
| 1,2-dichlorobenzene | NA | 2.09E+02 | | na | NA | 3.01E+05 | | na |
| benzyl alcohol | ΑN | 1.10E+03 | | na | NA | 5.53E+04 | | na |
| bis(2-chlorolsopropyi)ether | ΑN | 1.92E-01 | | na | NA | 6.99E+04 | | na |
| 2-methylphenol | ΨN | 1.83E+02 | | na | NA | AN | | na |
| hexachloroethane | NA | 4.80E-01 | | na | NA | 2.90E+04 | | na |
| n-nitroso-di-n-propylamine | ΨN | 9.61E-04 | | na | AA | 2.00E+02 | | na |
| 4-methylphenol | AN | 1.83E+02 | | na | ۸A | ΑN | | na |
| nitrobenzene | ΑN | 2.09E+00 | | na | NA | 1.51E+04 | | na |
| Isophorone | AN | 7.08E+00 | | na | ۸A | 2.83E+04 | | na |
| 2-nitrophenol | AN | NV | | na | A A | AN | | na |
| 2,4-dimethylphenol | NA | 7.30E+01 | | na | Ā | ΑΝ | | na |
| bis(2-chloroethoxy)methane | AN | N | | na | ¥ | Ψ | | na |
| 2,4-dichlorophenol | ΝA | 1.10E+01 | | na | ΑΝ | 3.00E+04 | | na |
| 1,2,4-trichlorobenzene | NA | 2.08E+02 | | na | ΑN | 3.71E+04 | | na |
| naphthalene | 5.24E-04 | 3.13E+00 | 1.67E-04 | 90 | 2.34E+00 | 7.86E+04 | 2.98E-05 | 9 |
| 4-chloroaniline | NA | 1.46E+01 | | na | NA NA | 3.00E+04 | | na |
| hexachlorobutadlene | NA | 8.62E-02 | | na | NA | 3.21E+04 | | na |
| 4-chloro-3-methylphenol | NA | N< | | na | ΝΑ | 2.00E+04 | | na |
| 2-methylnaphthalene | AN | 7.30E+01 | | na | ΑN | 2.00E+04 | | na |
| hexachlorocyclopentadlene | NA | 7.30E-02 | | na | VA | 2.23E+02 | | na |
| 2,4,6-trichlorophenol | AN | 1.10E+02 | | na | NA | NA | | na |
| 2,4,5-trichtorophenol | AN | 3.65E+02 | | na | ΑĀ | 3.00E+04 | | na |
| 2-chloronaphthalene | AN | 2.92E+02 | | na | NA | 6.00E+02 | | na |
| 2-nitroaniline | NA | 2.09E-01 | | na | ΝΑ | AA | | na |
| dimethylphthalate | NA | 3.65E+04 | | па | NA A | 1.50E+04 | | na |
| 2,6-dinitrotoluene | NA | 3.65E+00 | | na | A A | 6.00E+02 | | na |

Table D-45: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds 200 meter location

| | | վ ե ջատ քո | i Bulliedo | arge N DODIC | arge M3A1 (zone 3), DODIC: DS40 | 155mm propelling charge M3A1 (zone 3), M199 cannon DODIC: DS40 | | |
|----------------------------|-----------------------------|--|--------------------------------|-----------------|------------------------------------|---|-------------|------|
| Compound | С _{сһгонс} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chrontc} / HBSL | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| 3-nitroaniline | NA | N | | na | ΑN | 9.00E+03 | | g |
| 2,4-dinitrophenol | ۸A | 7.30E+00 | | na | NA | 7.50E+03 | | na |
| dibenzofuran | NA | 1.46E+01 | | na | NA | ¥ | | na |
| 2,4-dinitrotoluene | AN . | 7.30E+00 | | na | NA | 6.00E+02 | | na |
| 4-nitrophenol | ¥ | 2.92E+01 | | na | ΑN | 3.00E+04 | | na |
| 4-chlorophenyl-phenylether | ΝΑ | N< | | na | ΑN | AA | | 23 |
| diethylphthalate | ۸ | 2.92E+03 | | na | ۷A | 1.50E+04 | | 20 |
| 4-nitroaniline | ΝΑ | NV | | na | AN | 9.00E+03 | | 2 |
| 4,6-dinitro-2-methyiphenol | NA NA | 3.65E-01 | | Бā | ΑΝ | 5.00E+02 | | 5 6 |
| n-nitrosodiphenylamine(1) | AN | 1.37E+00 | | na | ¥ | AN | | 2 0 |
| 4-bromophenyl-phenylether | ΝA | ≥ | | g | A'N | AA | | 2 0 |
| hexachlorobenzene | NA | 4.18E-03 | | ē | ΑΝ | 7.50E+01 | | 2 2 |
| pentachlorophenol | ۷N | 5.60E-02 | | na | Ą | 1.50E+03 | | 5 6 |
| di-n-butyiphthalate | AN | 3.65E+02 | | E | NA A | 1.50E+04 | | 2 2 |
| butylbenzylphthalate | ۷A | 7.30E+02 | | Ba | AN | 5.00F+05 | | 2 2 |
| bis(2-ethylhexyl)phthalate | ۷V | 4.80E-01 | | na | AN AN | 1.00E+04 | | 0.00 |
| di-n-octylphthalate | NA | 7.30E+01 | | Вп | ΑN | 1.50E+05 | | 2 2 |
| otnotes: | | | | | | | | |

NA = Not applicable

na = Not available because health-based screening value is not available or not applicable because compound was not detected.

NV = No value

Cehronic = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

C_{acute} = Acute concentration

ATV = Acute toxicity value

Table D-46: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aldehydes, and Acid Gases

| | | 155mm | propelling | Harge P | 155mm propelling charge M3A1 (zone 3), M199 cannon DODIC: D540 | M199 cannon | | |
|-------------------------------------|------------------------------|--|--------------------------------|---------|---|---------------------------------|-------------|------|
| Compound | С _{сһгопіс} (µg/m³) | Health-Based Screening Level (µg/m³) | G _{chronic} / HBSL | >1? | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| PAHs | | | | | | | | |
| acenaphthylene | 8.62E-05 | NV | | na | 3.85E-01 | 2.00E+02 | 1.92E-03 | 01 |
| acenaphthene | 9.72E-06 | 2.19E+02 | 4.44E-08 | no | 4.34E-02 | 1.25E+03 | 3.47E-05 | 92 |
| fluorene | 3.38E-05 | 1.46E+02 | 2.31E-07 | no | 1.51E-01 | 7.50E+04 | 2.01E-06 | ou |
| phenanthrene | 5.79E-05 | NN | | na | 2.59E-01 | 2.00E+03 | 1.29E-04 | 2 |
| anthracene | 7.13E-06 | 1.10E+03 | 6.51E-09 | ou , | 3.18E-02 | 6.00E+03 | 5.31E-06 | ou |
| fluoranthene | 3.20E-05 | 1.46E+02 | 2.19E-07 | no | 1.43E-01 | 3.00E+01 | 4.77E-03 | 2 |
| pyrene | 7.70E-05 | 1.10E+02 | 7.03E-07 | no | 3.44E-01 | 1.50E+04 | 2.29E-05 | on |
| benzo(a)anthracene | 1.85E-06 | 2.17E-02 | 8.55E-05 | no | 1.93E-02 | 6.00E+02 | 3.22E-05 | no |
| chrysene | 2.26E-06 | 2.17E+00 | 1.04E-06 | uo | 2.36E-02 | 2.00E+02 | 1.18E-04 | 00 |
| benzo(b)fluoranthene | 6.59E-06 | 2.17E-02 | 3.04E-04 | no | 1.72E-02 | AN | | na |
| benzo(k)fluoranthene | 4.26E-06 | 2.17E-01 | 1.96E-05 | no | 1.11E-02 | NA | | na |
| benzo(a)pyrene | 8,42E-06 | 2.17E-03 | 3.88E-03 | no | 8.78E-02 | 7.50E+03 | 1.17E-05 | ౾ |
| indeno(1,2,3-cd)pyrene | 1.50E-05 | 2.17E-02 | 6.94E-04 | no | 3.92E-02 | NA | | na |
| dlbenz(a,h)anthracene | 4.72E-07 | 2.17E-03 | 2.17E-04 | no | 4.91E-03 | 3.00E+04 | 1.64E-07 | 2 |
| benzo(g,h,i)perylene | 6.87E-05 | N< | | na | 3.07E-01 | 3.00E+04 | 1.02E-05 | 2 |
| Dioxins / Furans | | | | | | | | |
| 2378-Tetrachlorodibenzo-p-dloxin | NA | 4.48E-08 | | na | AN | 3.50E+00 | | na |
| 12378-Pentachlorodibenzo-p-dioxin | 5.90E-11 | N | | na | 2.63E-07 | 2.50E+00 | 1.05E-07 | no |
| 123478-Hexachlorodibenzo-p-dioxin | AN | N | | na | NA | NA | | na |
| 123678-Hexachlorodibenzo-p-dioxin | 1.68E-10 | N N | | na | 7.48E-07 | 1.50E+01 | 4.99E-08 | 2 |
| 123789-Hexachlorodibenzo-p-dloxin | 8.07E-11 | 1.48E-06 | 5.46E-05 | 20 | 2.10E-07 | NA | | na |
| 1234678-Heptachlorodibenzo-p-dloxin | 1.67E-09 | ≥ | | na | 1.87E-06 | AA | | na |
| Octachlorodibenzo-p-dloxin | 6.55E-09 | N | | na | 7.31E-06 | NA | | na |
| 2378-Tetrachlorodibenzo-p-furan | NA | ≩ | | na | NA | 2.00E+00 | | na |
| 12378-Pentachlorodibenzo-p-furan | NA | ≩ | | na | NA | NA | | na |
| 23478-Pentachlorodibenzo-o-furan | ΑΝ | ₽ | | na | ΝΑ | 7.50E-02 | | na |
| 123478-Hexachlorodibenzo-p-furan | 2.99E-11 | N | | na | 1.34E-07 | 7.50E+00 | 1.78E-08 | 2 |
| 123789-Hexachlorodibenzo-p-furan | ΑN | N N | | na | AN | NA | | na |
| 234678-Hexachlorodibenzo-p-furan | AM | ⋛ | | na | NA | 1.50E+00 | | na |
| 1234678-Heptachlorodlbenzo-p-furan | 1.10E-10 | Ž | | na | 1.23E-07 | NA | | na |
| 1234789-Heptachlorodlbenzo-p-furan | , NA | N N | | na | NA | NA | | na |
| OCDF | 2.18E-10 | Ž | | na | 2.43E-07 | NA | | na |
| Aldehydes | | | | | | | | |
| Formaldehyde | ΨN | 1.48E-01 | | па | ΑN | 1.23E+03 | | na |

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Table D-46: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aldehydes, and Acid Gases 200 meter location

| | | 15smm | propellings | harge A DODIC | arge M3A1 (zone 3), Dobic: 5540 | 155mm propelling charge M3A7 (zone 3), M199 cannon Dobic: D840 | | |
|--------------------------|------------------------------|--|--------------------------------|------------------|------------------------------------|---|-------------|------|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | × 12 | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | . 12 |
| Acetaldehyde | AN | 8.73E-01 | | БП | ¥ | 1.80E+04 | | na |
| Acetone | ΑN | 3.65E+02 | | na | NA | 2.37E+06 | | na |
| Acrotein | NA NA | 2.09E-02 | | na | ΑN | 2.30E+02 | | na |
| Proprionaldehyde | NA N | N | | na | AN | 7.50E+04 | | na |
| Crotonaldehyde | AN | 3.54E-03 | | na | ۷N | 5.72E+03 | | па |
| Butyraldehyde | ΑN | N | | , na | ΥŅ | 7.38E+04 | | na |
| Benzaldehyde | AN | 3.65E+02 | | na | NA | 1.50E+04 | | na |
| Isovaleraldehyde | ۷N | NN | | na | NA | ۷N | | na |
| Vateraldehyde | ΑN | N | | na | AN | ۷N | | na |
| o,m,p-Toluaidehyde | NA | N | | na | NA | ۸A | | na |
| Hexaldehyde | NA | N | | na | NA | ΑN | | na |
| 2,5-Dimethylbenzaldehyde | AN | N/ | | na | NA | ۷N | | na |
| Acid Gases | | | | | | | | |
| Hydrogen fluoride | ΝA | NV | | na | AN | 1.60E+03 | | na |
| Hydrogen chloride | NA | 2.08E+01 | | na | NA | 4.50E+03 | | na |
| Hydrogen bromide | AN | NV | | na | NA | 9.93E+03 | | na |
| Nitric Acid | AN | NV | | na | NA | 5.16E+03 | | na |
| Phosphoric acid | NA | 1.04E+01 | | na | NA | 3.00E+03 | | na |
| Sulfuric Acid | AN | NV | | na | NA | 2.00E+03 | | na |
| - colombia | | | | | | | | |

Footnote:

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

Cohronic = Chronic time-averaged concentration; HBSL = Chronic health-based screening level

Cacute = Acute concentration; ATV = Acute toxicity value

Table D-47: Comparison of Air Concentrations With Health-Based Values: Cyanides and Energetics

200 meter location

| ZOU IIIBIBI IOCALIOII | | 155mm | propelling | charge | 155mm propelling charge M3A1 (zone 3), M199 cannon | M199 cannon | | |
|---|------------------------------|--|--------------------------------|--------|--|---------------------------------|-------------|------|
| | | | | DODIC | ; D540 | | | |
| Compound | G _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 12 | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| Particulate Cyanide and Hydrogen | | | | | | | | |
| Particulate Cvanide | AN | 7.30E+01 | | па | ΑN | 5.00E+03 | | na |
| Hydrogen Cyanide | 6.69E-02 | 3.13E+00 | 2.14E-02 | no | 2.99E+02 | 5,17E+03 | 5.78E-02 | no |
| Energetics | | | | | | | | |
| Nitrobenzene | NA | 2.09E+00 | • | na | NA | 1.51E+04 | | na |
| 2-Nitrotoluene | NA | 3.65E+01 | | na | NA | NA | | na |
| 3-Nitrotoluene | ΑN | 3.65E+01 | | na | NA | NA | | na |
| 4-Nitrotoluene | NA | 3.65E+01 | | na | NA | 3.37E+04 | | na |
| Nitroglycerine | ΑN | 4.80E-01 | | na | NA | NA | | na |
| 1,3-Dinitrobenzene | Ν | 3.65E-01 | | na | NA | 3.00E+03 | | na |
| 2,6-Dinitrotoluene | NA | 3.65E+00 | | na | ۷A | 6.00E+02 | | na |
| 2,4-Dinitrotoluene | NA | 7.30E+00 | | na | AN | 6.00E+02 | | na |
| 1,3,5-Trinitrobenzene | NA | 1.10E+02 | | na | WA | 3.00E+04 | | na |
| 2,4,6-Trinitrotoluene | NA | 2.24E-01 | | na | ΝA | 2.50E+04 | | na |
| RDX | NA | 6.11E-02 | | na | NA | NA | | na |
| 4-Amino-2,6-Dinitrotoluene | NA | N | | | NA | NA | | |
| 2-Amino-4,6-Dinitrotoluene | NA | N | | | NA | 1.50E+04 | | |
| Tetryl | AN | 3.65E+01 | | na | NA | NA | | na |
| HMX | AN | 1.83E+02 | | na | NA | NA | | na |
| Pentaerythritoltetranitrate | NA | NV | | na | NA | 5.00E+01 | | na |
| Dibutyl phthalate | NA | 3.65E+02 | | na | NA | 1.50E+04 | | na |
| Dioctyl phthalate | NA | 4.80E-01 | | na | NA A | 1.00E+04 | | na |
| Diphenylamine | NA | 9.13E+01 | | na | NA | 3.00E+04 | | na |
| Footnote: NA = Not applicable because compound was not detected. | s not detected. | | | | | | | |

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

Cohronic = Chronic time-averaged concentration; HBSL = Chronic health-based screening level

Cacute = Acute concentration; ATV = Acute toxicity value

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Table D-48: Comparison of Air Concentrations With Health-Based Values: Total Petroleum Hydrocarbons 200 meter location

| | 155ที่ที่ ค | 155mm propeillng charge M3A1 (zone 3), M199 cannon D©DIC: D540 | arge M3A1 (zone 3), M1 D©DIC: D640 | 99 cannon |
|--------------------------------------|---------------------|---|---------------------------------------|------------------------------|
| Compound (a) | Gehronic (µg/m³) | C _{chronic} (µg/m³) | C _{chronic} (µg/m³) | C _{chronic} (µg/m³) |
| | Allphatic:C<=8 | Allphatic:C>8 | Aromatic:C<=8 | Aromatic:C>8 |
| Benzene | NA | NA | 1.04E-02 | NA |
| Toluene | AN | AN | 5.07E-04 | NA |
| naphthalene | NA | · NA | NA | 5.24E-04 |
| acenaphthylene | NA | NA | NA | 8.62E-05 |
| acenaphthene | AN . | NA . | NA | 9.72E-06 |
| fluorene | NA | NA | NA | 3.38E-05 |
| phenanthrene | NA | NA | NA | 5.79E-05 |
| anthracene | NA | NA | NA | 7.13E-06 |
| Total (µg/m³) | 00+300 ⁰ | 0.00E+00 | 1.09E-02 | 7.18E-04 |
| Derived Health-Based Screening Level | 1.92E+04 | 1.04E+03 | 4.17E+02 | 2.09E+02 |
| C _{chronic} /HBSL | 0.00日+00 | 0.00E+00 | 2.61E-05 | 3.44E-06 |
| >12 | no | no | no | no |
| otnotes. | | | | |

Footnotes:

>1? = Is the ratio greater than one?

NA = Not Applicable because compound was not detected

C_{chronle} = chronic averaged air Concentration (not adjusted for cancer averaging time of 70 years)

HBSL = Health-Based Screening Level

RISK EVALUATION DATA FOR CHARGE M3A1, FIRED FROM THE M284 CANNON, ZONE 3, 100 METERS DOWNWIND

Table D-49: Comparison of Air Concentrations With Health-Based Values: Gases, Particulates and Metals

100 meter location

| | 5 | | | | | | | |
|-----------------------------------|------------------------------|--|--------------------------------|-------------------|------------------------------------|---|-------------|----------|
| | | 155Inm | propelling | charge n DODIC | arge M3A1 (2one 3), Dobic: 0540 | 155inim propelling charge M3A1 (zone 3), M284 cannon DODIC: D540 | | |
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | G _{chronic} / HBSL | > 1? | Gacute (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| Gases | | | | | | | | |
| NH ₃ | 1.89E+00 | 1.04E+02 | 1.81E-02 | ou Ou | 2.11E+03 | 1.75E+04 | 1.21E-01 | 92 |
| Carbon Dioxide (CO ₂) | 2.09E+01 | ≥ | | na | 9.34E+04 | 5.40E+07 | 1.73E-03 | 92 |
| Carbon Monoxide (CO) | 5.66E+01 | 1.57E+02 | 3.61E-01 | no | 6.32E+04 | 2.30E+05 | 2.75E-01 | 2 |
| Nitrogen Oxides (as NO) | 1.01E+00 | 1.00E+02 | 1.01E-02 | no | 4.51E+03 | 2.70E+05 | 1.67E-02 | ou |
| Methane (CH4) | NA | N | | na | AN | 3.30E+06 | | na |
| Sulfur Dioxide (SO ₂) | NA | 8.00E+01 | | na | Ą | 7.89E+02 | | na |
| Combined Particulate | | | | | | | | |
| TSP | 2.00E+00 | 5.00E+01 | 4.00E-02 | 20 | 2.23E+03 | AA | | na na |
| PM ₁₀ | 1.77E+00 | 5.00E+01 | 3.55E-02 | 20 | 1.98E+03 | AN | | na |
| PM _{2.5} | 9.93E-01 | 1.50E+01 | 6.62E-02 | 2 | 1.11E+03 | NA | | eu |
| Metals | | | | | | | | 5 |
| Antimony | NA | 1.46E+00 | | na | ٩N | 1.50E+03 | | na |
| Arsenic | 2.93E-05 | 4.47E-04 | 6.56E-02 | 2 | 3.05E-01 | 3.00E+01 | 1.02E-02 | 2 |
| Barlum | 1.58E-03 | 5.21E-01 | 3.03E-03 | no | 7.07E+00 | 1.50E+03 | 4.71E-03 | 92 |
| Beryllium | ΝΑ | 8.00E-04 | | na | ΑN | 5.00E+00 | | na |
| Cadmium | NA | 1.07E-03 | | na | NA | 3.00E+01 | | na |
| Chromium | 6.19E-05 | 1.53E-04 | 4.06E-01 | no | 6.46E-01 | 1.50E+03 | 4.30E-04 | ou |
| Cobalt | 2.19E-05 | 2.20E+02 | 9.96E-08 | 2 | 9.79E-02 | 6.00E+01 | 1.63E-03 | 02 |
| Copper | 7.77E-02 | 1.46E+02 | 5.32E-04 | 10 | 3.47E+02 | 3.00E+03 | 1.16E-01 | 20 |
| Lead | 5.58E-03 | 1.50E+00 | 3.72E-03 | 20 | 2.49E+01 | 1.50E+02 | 1.66E-01 | ou Ou |
| Manganese | 4.79E-04 | 5.11E-02 | 9.38E-03 | 2 | 2.14E+00 | 3.00E+03 | 7.13E-04 | 01 |
| Nickel | 2.24E-10 | 7.30E+01 | 3.06E-12 | 20 | 9.99E-01 | 3.00E+03 | 3.33E-04 | 20 |
| Selenium | NA | 1.83E+01 | | na | NA | 6.00E+02 | | na |
| Silver | ΔN | 1.83E+01 | | na | NA | 3.00E+02 | | na |
| Thallium | ΑN | 2.56E-01 | | na | NA | 3.00E+02 | | na |
| Zlnc | 1.47E-08 | 1.10E+03 | 1.34E-11 | no | 6.55E+01 | 3.00E+04 | 2.18E-03 | no n |
| ontrofe: | | | | | | | | |

Footnote:

NA = Not applicable because compound was not detected. Ins = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

 $C_{\rm chronic}$ = Chronic time-averaged concentration; HBSL = Chronic health-based screening level $C_{\rm scute}$ = Acute concentration; ATV = Acute toxicity value

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Table D-50: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

| 100 meter location | | | | | | | | |
|---------------------------------------|------------------------------|--|--------------------------------|-----------------------------|----------------------------|---|---|----------|
| | | 155mm pro | pelling ch | arge M3A1 (z D@DIC: D540 | 3A.1 (zone 3), : D540 | 155mm propelling charge M3A1 (zone 3), M284 cannon BODIC: D540 | A Section Control of the Control of | |
| Compound (a) | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 1? |
| VOCs | | | | | | | | |
| Dichlorodiffuoromethane | ¥ | 2.09E+02 | | na | NA | 1.48E+07 | | na |
| Methyl Chloride | ¥N. | 1.07E+00 | | na | NA | 2.06E+05 | | g |
| Dichlorotatraflioroathana | AN AN | ⋛ | | na | NA | NA | | Вa |
| Vinvi Chloride | Ą | 2.20E-02 | • | na | NA | 1.28E+04 | | na |
| 1.3-Butadlene | ΑN | 3.74E-03 | | na | NA | 2.20E+04 | | Бā |
| Methyl Bromide | AN | 5.21E+00 | | na | AA | 5.82E+04 | | na |
| Ethyl Chloride | AN AN | 2.32E+00 | | na | NA | 7.92E+06 | | na |
| Trichlorofluoromethane | AN AN | 7.30E+02 | | na | NA | 2.81E+06 | | na |
| 1.1-Dichloroethene | 2.31E-04 | 5.21E+02 | 4.44E-07 | ou | 2.58E-01 | 7.92E+04 | 3.26E-06 | 2 |
| Dichloromethane | 6.67E-03 | 4.09E+00 | 1.63E-03 | ou | 1.74E+01 | 6.96E+05 | 2.50E-05 | 2 |
| 3-Chloropropene | AN | 1.04E+00 | | na | NA | 9.39E+03 | | Бā |
| 1 1 2-Trichtoro-1.2.2-triffuoroethane | NA | 3.13E+04 | | na | NA | 9.58E+06 | | na |
| 1.1-Dichloroethane | AN A | 5,21E+02 | | na | AN A | 1.21E+06 | | na |
| cls-1.2-Dichloroethene | NA | 3.65E+01 | | na | NA | 7.92E+05 | | na |
| Trichloromethane | NA | 8.35E-02 | | na | NA | 9.76E+03 | | na |
| 1.2-Dichloroethane | ΑN | 7.39E-02 | | na | ΝΑ | 8.08E+03 | | na |
| 1,1.1-Trichloroethane | 1.54E-03 | 1.04E+03 | 1.48E-06 | on O | 1.72E+00 | 1.94E+06 | 8.85E-07 | 2 |
| Benzene | 2.22E-03 | 2.49E-01 | 8.91E-03 | ဥ | 5.78E+00 | 1.56E+05 | 3.71E-05 | 2 |
| Carbon Tetrachloride | AN | 1.28E-01 | | na | ΑN | 1.28E+05 | | g |
| 1,2-Dichloropropane | NA | 9.89E-02 | | па | Y. | 5.08E+05 | | la I |
| Trichloroethene | ΝΑ | 1.12E+00 | | na | ¥N. | 5.385+05 | | III |
| cls-1,3-Dichloropropene | AN N | 5.17E-02 | , | na | 4 × | 1.14E+04 | | 2 2 |
| trans-1,3-Dichloropropene | ΑN | 5.17E-02 | | na | ¥N. | 104 E 4 E 4 E 4 E 4 E 4 E 4 E 4 E 4 E 4 E | | <u> </u> |
| 1,1,2-Trichloroethane | | 1.20E-01 | | na | ¥N. | CO+11+0.1 | 20 170 0 | 2 |
| Toluene | 3.37E-04 | 4.02E+02 | 8.40E-07 | 2 | 3.77E-01 | 1.885+05 | Z.01E-06 | 2 |
| 1,2-Dibromoethane | NA | 8.73E-03 | | na | ¥. | 1.545+05 | | na |
| Tetrachloroethene | NA | 3,31E+00 | | na | Y. | 6.78E+05 | | na L |
| Chlorobenzene | NA | 6.21E+01 | | g | Y. | 1.38E+05 | | la l |
| Ethylbenzene | NA | 1.06E+03 | | па | AN . | 5.43E+05 | | na |
| m&p-Xylene | NA | 7.30E+02 | | na | NA | 0.315+03 | | |

Table D-50: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

100 meter location

| 100 meter location | | • | | | | | | |
|-----------------------------------|------------------------------|--|--------------------------------|-----------------|------------------------------------|---|-------------|------|
| | | oyd wwggt | pelling ch | arge M Dodig | arge M3A3 (zone 3), DODIG: D540 | 155mm propelling charge M3AJ (zone 3), M284 cannon DODIG: D540 | | |
| Compound (a) | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronlc} / HBSL | >12 | Gacute (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| Styrene | ΨN | 1.06E+03 | | na | ۸A | 2.13E+05 | | па |
| 1,1,2,2-Tetrachloroethane | AN | 3.31E-02 | | na | NA | 2.06E+04 | | na |
| o-Xylene | NA | 7.30E+02 | | na | NA | 6.51E+05 | | an |
| 4-Ethyltoluene | NA | N/ | | na | NA | 1.25E+05 | | na |
| 1,3,5-Trimethylbenzene | NA | 6.21E+00 | | na | NA | 3.68E+05 | | na |
| 1,2,4-Trimethylbenzene | AN | 6.21E+00 | | na | NA | 1.80E+05 | | na |
| Benzyl Chloride | AN | 3.96E-02 | | na | AN | 5.20E+03 | | na |
| m-Dichlorobenzene | AN | 3.29E+00 | | na | NA | 3.61E+04 | | na |
| p-Dichlorobenzene | NA | 3.06E-01 | | na | NA | 6.61E+05 | | па |
| o-Dichlorobenzene | NA | 2.09E+02 | | na | NA | 3.01E+05 | | na |
| 1,2,4-Trichlorobenzene | NA | 2.08E+02 | | na | NA | 3.71E+04 | | na |
| Hexachlorobutadiene | NA | 8.62E-02 | | na | NA | 3.21E+04 | | na |
| Hydrocarbons | | | | | | | | |
| Methane | 7.27E-02 | NN | | na | 3.25E+02 | 3.30E+06 | 9.84E-05 | 2 |
| Ethane | NA | N | | na | NA | AN | | na |
| Ethylene | NA | NN | | na | NA | 4.60E+05 | | na |
| Propane | NA | NN | | na | NA | 3.78E+06 | | na |
| Acetylene | AN | NN | | eu | NA | AN | | na |
| Isobutane | NA | /N | | eu | ۸A | 9.52E+05 | | na |
| n-Butane | AN | NV | | na | AN | 5.71E+06 | | na |
| Propylene | NA | NV | | na | NA | ΝA | | na |
| Footnotes: NA = Not applicable | | | | | | | | |
| | | | | | | | | • |

na = Not available because health-based screening value is not available or not applicable because compound was not detected.

NV = No value

C_{chronic} = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

Cacute = Acute concentration

· :

ATV = Acute toxicity value

Table D-51: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

| ION INGUE TOCAROLL | | | | | | | | |
|-----------------------------|------------------------------|--|--------------------------------|------------------|-------------------------------------|--|-------------|------|
| | | 155mm pr | opelling c | narge N DODIC | large M3A1 (zone 3), ĎODIC: D540 | 155inm propelling charge M3A1 (zone 3), M284 cannon DODIC: D540 | | |
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 17 |
| SVOCS | | | | | | | | |
| n-nitrosodimethylamine | ΑN | 1.37E-04 | | na | NA | 2.50E+03 | | na |
| bis(2-chloroethyl)ether | AM | 5.82E-03 | | na | NA | 5.85E+04 | | na |
| phenol | 8.81E-04 | 2.19E+03 | 4.03E-07 | no | 3.94E+00 | 3.85E+04 | 1.02E-04 | uo |
| 2-chlorophenol | ΑN | 1.83E+01 | | na | NA | 5.25E+03 | | na |
| 1,3-dichlorobenzene | ΑΝ | 3.29E+00 | | na | NA | 3.61E+04 | | na |
| 1,4-dichlorobenzene | ΝA | 3.06E-01 | | na | NA | 6.61E+05 | | na |
| 1,2-dichlorobenzene | ΑΝ | 2.09E+02 | | na | NA | 3.01E+05 | | na |
| benzyl alcohol | ΝΑ | 1.10E+03 | | na | NA | 5.53E+04 | | na |
| bis(2-chloroisopropyl)ether | ΑN | 1.92E-01 | | na | NA | 6.99E+04 | | na |
| 2-methylphenol | Ϋ́ | 1.83E+02 | | na | NA | NA | | na |
| hexachloroethane | NA | 4.80E-01 | | na | NA | 2.90E+04 | | na |
| n-nitroso-di-n-propylamine | AN | 9.61E-04 | | na | NA | 2.00E+02 | | na |
| 4-methylphenol | NA | 1.83E+02 | | na | AN | ΑN | | na |
| nitrobenzene | NA | 2.09E+00 | | na | AA | 1.51E+04 | | na |
| Isophorone | NA | 7.08E+00 | | na | A A | 2.83E+04 | | na |
| 2-nitrophenol | NA | NV | | na | NA | ΝΑ | | na |
| 2,4-dimethylphenol | NA | 7.30E+01 | | na | ΝA | ΑN | | na |
| bis(2-chloroethoxy)methane | NA | ۸N | | na | NA | NA | | na |
| 2,4-dichlorophenol | NA | 1.10E+01 | | na | NA | 3.00E+04 | | na |
| 1,2,4-trichlorobenzene | NA | 2.08E+02 | | na | NA | 3.71E+04 | | na |
| naphthalene | 2.98E-04 | 3.13E+00 | 9.53E-05 | 20 | 1.33E+00 | 7.86E+04 | 1.69E-05 | no |
| 4-chloroaniline | AN | 1.46E+01 | | na | ΝΑ | 3.00E+04 | | na |
| hexachlorobutadiene | NA | 8.62E-02 | | na | AA | 3.21E+04 | | na |
| 4-chloro-3-methylphenol | NA | N | | na | NA V | 2.00E+04 | | na |
| 2-methylnaphthalene | NA | 7.30E+01 | | na | ΔA | 2.00E+04 | | na |
| hexachlorocyclopentadlene | NA | 7.30E-02 | | na | ΝΑ | 2.23E+02 | | na |
| 2,4,6-trichlorophenol | AN | 1.10E+02 | | na | ΨN | NA | | na |
| 2,4,5-trichlorophenol | NA | 3.65E+02 | | na | NA NA | 3.00E+04 | | na |
| 2-chloronaphthalene | NA | 2.92E+02 | | na | NA NA | 6.00E+02 | | na |
| 2-nitroaniline | NA | 2.09E-01 | | na | ΑN | NA | | na |
| dimethylphthalate | NA | 3.65E+04 | | na | AN | 1.50E+04 | | na |
| 2,6-dinitrotoluene | NA | 3.65E+00 | | na | NA | 6.00E+02 | | na |

Table D-51: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

100 meter location

| | | 1111 | ALC: SCHOOL STATE | - | 10 7 7 7 V V V V V V V V V V V V V V V V | Manage Land | 1000 | |
|--|------------------------------|--|--------------------------------|-----------|--|---|-------------|------|
| | | nd minicer | opening ci | | arge modil (zone o), DODIC: DS40 | 155mm propelling charge work (2016 3), wize4 cannon DÖDIG: D\$40 | | |
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | Cacute (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 1? |
| 3-nitroaniline | AN | N | | na | AN | 9.00E+03 | | na |
| 2,4-dinitrophenol | NA | 7.30E+00 | | na | NA | 7.50E+03 | | na |
| dlbenzofuran | ΑN | 1.46E+01 | | na | NA | NA | | na |
| 2,4-dinitrotoluene | NA | 7.30E+00 | | na | NA | 6.00E+02 | | na |
| 4-nitrophenol | ΑN | 2.92E+01 | | , na | NA | 3.00E+04 | | na |
| 4-chlorophenyl-phenylether | NA | N | | na | NA | NA | | na |
| diethyiphthalate | AN | 2.92E+03 | | na | NA | 1.50E+04 | | na |
| 4-nitroaniline | ΑN | ۸N | | na | NA | 9.00E+03 | | na |
| 4,6-dinitro-2-methylphenol | NA | 3.65E-01 | | na | NA | 5.00E+02 | | na |
| n-nitrosodiphenylamine(1) | NA | 1.37E+00 | | na | NA | NA | | na |
| 4-bromophenyl-phenylether | NA | NN | | na | NA | NA | | na |
| hexachlorobenzene | NA | 4.18E-03 | | na | NA | 7.50E+01 | | na |
| pentachlorophenol | NA | 5.60E-02 | | na | NA | 1.50E+03 | | na |
| di-n-butyiphthalate | 5.57E-04 | 3.65E+02 | 1.53E-06 | ou | 2.49E+00 | 1.50E+04 | 1.66E-04 | 0U |
| butylbenzylphthalate | AN | 7.30E+02 | | na | AN | 5.00E+05 | | na |
| bis(2-ethylhexyl)phthalate | ΑN | 4.80E-01 | | na | AN | 1.00E+04 | | na |
| dl-n-octylphthalate | NA | 7.30E+01 | | na | NA | 1.50E+05 | | na |
| ootnotes: | | | | | | | | |
| /A = Not applicable a = Not available because bealth-based screening value is not available or not annificable because commonind was not detected | ent ecreening value | is not available or no | t annticable he | CO PSITES | mooning was not de | fected | | |
| IV = No value | | | | | | | | |
| Chronic time-averaged concentration | Sentration | | | | | | | |

C_{chronic} ≈ Chronic time-averaged concentration HBSL ≈ Chronic health-based screening level

Cacute = Acute concentration

ATV = Acute toxicity value

Table D-52: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aldehydes, and Acid Gases

155mm propelling charge M3A1 (zone 3), M284 cannon BODIC: D540 Health-Based

| Compound | С _{chronic} (µg/m³) | Screening Level (µg/m³) | C _{chronlc} / HBSL | × 1~ | Cacute (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | × 12 |
|-------------------------------------|------------------------------|-------------------------|--------------------------------|------|----------------|---------------------------------|-------------|------|
| 1 | | | | | | | | |
| | 4.96E-05 | N< | | na | 2.21E-01 | 2.00E+02 | 1.11E-03 | no |
| | AN | 2.19E+02 | | na | NA | 1.25E+03 | | na |
| | 2.04E-06 | 1.46E+02 | 1.39E-08 | п | 9.09E-03 | 7.50E+04 | 1.21E-07 | no |
| | 1.50E-05 | NV | | na | 6.71E-02 | 2.00E+03 | 3.35E-05 | ou |
| | 4.26E-06 | 1.10E+03 | 3.89E-09 | ou . | 1.90E-02 | 6.00E+03 | 3.17E-06 | no |
| | 1.47E-05 | 1.46E+02 | 1.01E-07 | no | 6.57E-02 | 3.00E+01 | 2.19E-03 | no |
| | 2.93E-05 | 1.10E+02 | 2.67E-07 | ou | 1.31E-01 | 1.50E+04 | 8.72E-06 | ou |
| | 1.12E-06 | 2.17E-02 | 5.15E-05 | no | 1.16E-02 | 6.00E+02 | 1.94E-05 | ou |
| | 1.12E-06 | 2.17E+00 | 5.15E-07 | no | 1.16E-02 | 2.00E+02 | 5.82E-05 | 10 |
| | 2.92E-06 | 2.17E-02 | 1.34E-04 | no | 7.60E-03 | NA | | na |
| | 1.93E-06 | 2.17E-01 | 8.88E-06 | 01 | 5.02E-03 | ΥN | | na |
| | 4.43E-06 | 2.17E-03 | 2.04E-03 | no | 4.61E-02 | 7.50E+03 | 6.15E-06 | ou |
| | 6.10E-06 | 2.17E-02 | 2.81E-04 | no | 1.59E-02 | NA | | na |
| | 2.09E-07 | 2.17E-03 | 9.65E-05 | 00 | 2.18E-03 | 3.00E+04 | 7.27E-08 | ou |
| | 2.52E-05 | N | | na | 1.13E-01 | 3.00E+04 | 3.75E-06 | no |
| | | | | | | | | |
| 2378-Tetrachlorodibenzo-p-dioxin | NA | 4.48E-08 | | na | NA | 3.50E+00 | | na |
| 12378-Pentachlorodibenzo-p-dloxin | NA | N | | na | NA | 2.50E+00 | | na |
| 123478-Hexachlorodibenzo-p-dioxin | NA | N | | na | NA | NA | | na |
| 123678-Hexachlorodibenzo-p-dioxin | 7.13E-11 | N | | na | 3.18E-07 | 1.50E+01 | 2.12E-08 | no |
| 123789-Hexachlorodibenzo-p-dioxin | 3.47E-11 | 1.48E-06 | 2.35E-05 | ٦٥ | 9.05E-08 | NA | | na |
| 1234678-Heptachlorodibenzo-p-dloxin | 8.47E-10 | Š | | na | 9.45E-07 | ۸A | | na |
| | 4.08E-09 | N | - | na | 4.55E-06 | AA | | na |
| 2378-Tetrachlorodibenzo-p-furan | NA | N | | na | NA | 2.00E+00 | | na |
| 12378-Pentachlorodibenzo-p-furan | NA | N | | na | NA | NA | | na |
| 23478-Pentachlorodibenzo-o-furan | NA | N | | na | NA | 7.50E-02 | | na |
| 123478-Hexachlorodibenzo-p-furan | ۷A | N | | na | NA | 7.50E+00 | | na |
| 123789-Hexachlorodibenzo-p-furan | ΝΑ | N | | na | NA NA | NA | | na |
| 234678-Hexachlorodibenzo-p-furan | AA | N | | na | NA | 1.50E+00 | | na |
| 1234678-Heptachlorodibenzo-p-furan | 5.98E-11 | N | | па | 6.68E-08 | NA | | na |
| 1234789-Heptachlorodibenzo-p-furan | - NA | N | | па | NA A | NA | | na |
| | 1.26E-10 | N | | na | 1.40E-07 | ΝΑ | | na |
| | | | | | | | | |
| | NA | 1.48E-01 | | na | NA | 1.23E+03 | | na |
| | | | | | | | | |

1/16/01

Table D-52: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aldehydes, and Acid Gases

| | | 165mm | propelling | chárgé A DÓDIC | iarge M3A1 (zone 3), DODIC: D540 | 155mm propelling charge M3A1 (zone 3), M284 cannon policy p540 | | |
|--------------------------|------------------------------|--|--------------------------------|-------------------|-------------------------------------|--|-------------|---------|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | G _{chronic} / HBSL | > 12 | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| Acetaldehyde | ۸A | 8.73E-01 | | na | ΑN | 1.80E+04 | | Eu |
| Acetone | NA | 3.65E+02 | | na | Ϋ́Α | 2.37E+06 | | na L |
| Acrolein | ΝΑ | 2.09E-02 | | eu | AA | 2.30E+02 | | na |
| Proprionaldehyde | NA | N/ | | na | ΝΑ | 7.50E+04 | | na |
| Crotonaldehyde | NA | 3.54E-03 | | na | ΑN | 5.72E+03 | | g |
| Butyraldehyde | NA | N N | | eu . | NA | 7.38E+04 | | na |
| Benzaldehyde | NA | 3.65E+02 | | na | ΝΑ | 1.50E+04 | | eu L |
| Isovaleraldehyde | ΑN | N | | na | NA | AN | | Ba |
| Valeraldehyde | NA | N/ | | na | NA | AN | | na |
| o,m,p-Tolualdehyde | , NA | N/ | | ВП | ΑN | NA NA | | 82 |
| Hexaldehyde | AN | N | | na | ¥ | NA | | 2 |
| 2,5-Dimethylbenzaldehyde | NA | N | | na | ΑN | NA | | 2 2 |
| Acid Gases | | | | | | | | 5 |
| Hydrogen fluoride | NA | N/ | | na | ¥ | 1.60E+03 | | a c |
| Hydrogen chloride | AN | 2.08E+01 | | na | NA | 4.50E+03 | | g |
| Hydrogen bromide | Α¥ | N | | na | ۷N | 9.93E+03 | | na |
| Nitric Acid | 1.90E-03 | N | | na | 2.12E+00 | 5.16E+03 | 4.10E-04 | 2 |
| Phosphoric acid | NA | 1.04E+01 | | na | ΑN | 3.00E+03 | | 2 2 |
| Sulfuric Acid | 2.80E-02 | ≥ | | na | 3.12E+01 | 2.00E+03 | 1.56E-02 | 2 |
| Footnote: | | | | | | | | |

NA = Not applicable because compound was not detected. na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

Cehronic = Chronic time-averaged concentration; HBSL = Chronic health-based screening level Cacuse = Acute concentration; ATV = Acute toxicity value

Table D-53: Comparison of Air Concentrations With Health-Based Values: Cyanides and Energetics

| 100 meter location | | 155mm | propelling | Harge A | 13/41 (zone 3), | 155mm propelling charge M3A1 (zone 3), M284 cannon | | |
|----------------------------------|------------------------------|--|--------------------------------|---------|-----------------|--|-------------|------|
| | | | | DODIC | 00DIG: 0540 | | | |
| Compound | С _{сhronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronte} / HBSL | > 1% | Cacute (µg/m³) | Acute Toxicity Value (μg/m³) | Cacute/ ATV | > 12 |
| Particulate Cyanide and Hydrogen | | | | | | | | |
| Particulate Cvanide | ΑΝ | 7.30E+01 | | na | ΑN | 5.00E+03 | | na |
| Hydrogen Cyanide | 8.53E-02 | 3.13E+00 | 2.73E-02 | no | 3.81E+02 | 5.17E+03 | 7.37E-02 | no |
| Energetics | | | | | | | | |
| Nitrobenzene | ΨN | 2.09E+00 | • | na | NA | 1.51E+04 | | na |
| 2-Nitrotoluene | ΑΝ | 3.65E+01 | | na | NA | NA | | na |
| 3-Nitrotoluene | NA | 3.65E+01 | | na | NA | NA | | na |
| 4-Nitrotoluene | ΑN | 3.65E+01 | | na | AN | 3.37E+04 | | na |
| Nitroglycerine | AN | 4.80E-01 | | na | NA | NA | | na |
| 1,3-Dinitrobenzene | AN | 3.65E-01 | | na | NA | 3.00E+03 | | na |
| 2,6-Dinitrotoluene | NA | 3.65E+00 | | na | ۸A | 6.00E+02 | | na |
| 2,4-Dinitrotoluene | NA | 7.30E+00 | | na | NA | 6.00E+02 | | na |
| 1,3,5-Trinitrobenzene | ΑN | 1.10E+02 | | na | NA | 3.00E+04 | | na |
| 2,4,6-Trinitrotoluene | AN | 2.24E-01 | | na | NA | 2.50E+04 | | na |
| RDX | NA | 6.11E-02 | | na | NA | NA | | na |
| 4-Amino-2,6-Dinitrotoluene | AN | NN | | | NA | NA | | |
| 2-Amino-4,6-Dinitrotoluene | NA | N N | | | NA | 1.50E+04 | | |
| Tetryl | AN | 3.65E+01 | | na | NA | AN | | na |
| HMX | NA | 1.83E+02 | | na | NA | NA | | na |
| Pentaerythritoltetranitrate | AN | | | na | NA | 5.00E+01 | | na |
| Dibutyl phthalate | NA | 3.65E+02 | | na | NA | 1.50E+04 | | na |
| Dioctyl phthalate | NA | 4.80E-01 | | na | NA | 1.00E+04 | | na |
| Diphenylamine | NA | 9.13E+01 | | na | NA | 3.00E+04 | | na |
| | | | | | | | | |

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV ≈ No value

Conronc = Chronic time-averaged concentration; HBSL = Chronic health-based screening level

Cacute = Acute concentration; ATV = Acute toxicity value

M3risk1.xls

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Table D-54: Comparison of Air Concentrations With Health-Based Values: Total Petroleum Hydrocarbons 100 meter location

| | 155mm p | ropelling charge I DODIC | 155mm propelling charge M3A1 (zone 3), M284 cannon DÓDIC: D540 | 84 cannon | |
|--|------------------------------|------------------------------|---|------------------------------|--|
| Compound (a) | C _{chronic} (µg/m³) | C _{chronic} (µg/m³) | C _{chronic} (µg/m³) | C _{chronic} (µg/m³) | |
| | Aliphatic: C<=8 | Allphatic:C>8 | Aromatic:C<=8 | Aromatic:C>8 | |
| Benzene | NA | NA | 5.18E-03 | AN | |
| Toluene | NA | NA | 3.37E-04 | NA | |
| naphthalene | NA | . NA | NA | 2.98E-04 | |
| acenaphthylene | NA | NA | AN | 4.96E-05 | |
| acenaphthene | NA | NA | NA | | |
| fluorene | NA | AN | AN | 2.04E-06 | |
| phenanthrene | NA | NA | AN | 1.50E-05 | |
| anthracene | NA | NA | NA | 4.26E-06 | |
| Total (µg/m³) | 0.00E+00 | 0.00E+00 | 5.52E-03 | 3.69E-04 | |
| Derived Health-Based Screening Level | 1.92E+04 | 1.04E+03 | 4.17E+02 | 2.09E+02 | |
| C _{chronic} /HBSL | 0.00E+00 | 0.00E+00 | 1.32E-05 | 1.77E-06 | |
| >12 | no | ou | ou | OU | |
| ootnotes: 17 = Is the ratio creater than one? | | | | | |
| | | | | | |

NA = Not Applicable because compound was not detected

 C_{chronic} = chronic averaged air Concentration (not adjusted for cancer averaging time of 70 years) HBSL = Health-Based Screening Level

RISK EVALUATION DATA FOR CHARGE M3A1, FIRED FROM THE M284 CANNON, ZONE 3, 200 METERS DOWNWIND

Table D-55: Comparison of Air Concentrations With Health-Based Values: Gases, Particulates and Metals

| 200 meter location | maga ga a | the second secon | Charles of the Control of the Contro | | | | | |
|-----------------------------------|---|--|--|------------------|------------------------------------|---|-------------|----------|
| | | 155mm | propelling c | Harge N DODIC | afge.N3A1 (zone 3), DODIC: D540 | 155mm propelling charge M3A1 (zone 3), M284 cannon DODIC: D540 | | X |
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | Gehronic/ HBSL | > 12 | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| Gases | | | | | | | | |
| NH3 | 9.05E-01 | 1.04E+02 | 8.68E-03 | no | 1.01E+03 | 1.75E+04 | 5.77E-02 | 2 |
| Carbon Dioxide (CO ₂) | 1.00E+01 | N | | na | 4.47E+04 | 5.40E+07 | 8.28E-04 | ရ |
| Carbon Monovide (CO) | 2.71E+01 | 1.57E+02 | 1.73E-01 | no | 3.03E+04 | 2.30E+05 | 1.32E-01 | no |
| Nitrogen Oxides (as NO) | 4.83E-01 | 1.00E+02 | 4.83E-03 | no | 2.16E+03 | 2.70E+05 | 7.99E-03 | 20 |
| Methane (CH₄) | AN | N | | na | NA | 3.30E+06 | | na |
| Sulfur Dioxide (SO ₂) | ΨN | 8.00E+01 | | na | ٧N | 7.89E+02 | | na |
| Combined Particulate | | | | | | | | |
| TSP | 9.58E-01 | 5.00E+01 | 1.92E-02 | no | 1.07E+03 | AA | | na |
| PM. | 8.49E-01 | 5.00E+01 | 1.70E-02 | no | 9.47E+02 | NA | | na |
| PM. | 4.75E-01 | 1.50E+01 | 3.17E-02 | ou | 5.31E+02 | NA NA | | па |
| Metals | | | | | | | | |
| Antimony | AN | 1.46E+00 | | na | AN | 1.50E+03 | | na |
| Arsenic | 1.40E-05 | 4.47E-04 | 3.14E-02 | ou | 1.46E-01 | 3.00E+01 | 4.87E-03 | 2 |
| Barlum | 7.58E-04 | 5.21E-01 | 1.45E-03 | 2 | 3.38E+00 | 1.50E+03 | 2.26E-03 | 2 |
| Beryllium | AN | 8.00E-04 | | na | ΝΑ | 5.00E+00 | | na |
| Cadmlum | AA | 1.07E-03 | | na | AA | 3.00E+01 | | na |
| Chromium | 2.97E-05 | 1.53E-04 | 1.94E-01 | 2 | 3.09E-01 | 1.50E+03 | 2.06E-04 | 2 |
| Cobalt | 1.05E-05 | 2.20E+02 | 4.77E-08 | ဍ | 4.69E-02 | 9.00E+01 | 7.01E-04 | 0 0 |
| Copper | 3.72E-02 | 1.46E+02 | 2.55E-04 | 2 | 1.00=+02 | 3,001 | 3.335-02 | 2 |
| Lead | 2.67E-03 | 1.50E+00 | 1.78E-03 | 2 | 1.19E+01 | 1.50E+02 | 7.95E-02 | 20 |
| Manganese | 2.29E-04 | 5.11E-02 | 4.49E-03 | 2 | 1.02E+00 | 3.00E+03 | 3.42E-04 | 20 |
| Nickel | 1,07E-10 | 7.30E+01 | 1.47E-12 | 2 | 4.78E-01 | 3.00E+03 | 1.59E-04 | ဍ |
| Selenium | AN | 1.83E+01 | | na | ΑĀ | 6.00E+02 | | na |
| Silver | AN | 1.83E+01 | | Вa | ΑΝ | 3.00E+02 | | g |
| Thalllum | NA | 2.56E-01 | | па | NA | 3.00E+02 | 20 270 7 | na |
| Zinc | 7.02E-09 | 1.10E+03 | 6.41E-12 | 2 | 3.13E+01 | 3.00E+04 | 1.04E-03 | 2 |
| | | | | | | | | |

NA = Not applicable because compound was not detected. na = Not avallable because health-based screening value is not avallable or not applicable if compound was not detected.

NV = No value

 $C_{chronic}$ = Chronic time-averaged concentration; HBSL = Chronic health-based screening level C_{acute} = Acute concentration; ATV = Acute toxicity value

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Table D-56: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds 200 meter location

| לים ווופופן וסכשווסוו | *************************************** | | 100 mg 10 | | | | | |
|---------------------------------------|---|--|--|------------------|------------------------------------|--|-------------|------|
| | | 155mm pro | pelling ci | iarge N DODIC | arge M3A1 (zone 3), Dobic: 0540 | 155mm propelling charge พิ3A1 (zone 3), M284 cannon Doblic: ฮร์ชด | | 7 |
| Compound (a) | С _{сьгопіс} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 1? |
| VOCs | | | | | | | | |
| Dichlorodifluoromethane | NA | 2.09E+02 | | na | ΨN | 1.48E+07 | | БП |
| Methyl Chloride | NA | 1.07E+00 | | na | Ϋ́ | 2.06E+05 | | ББ |
| Dichlorotetrafluoroethane | AN | N N | | na | ΑΝ | NA | | na |
| Vinyi Chloride | AN | 2.20E-02 | • | na | NA | 1.28E+04 | | na |
| 1,3-Butadlene | NA | 3.74E-03 | | na | NA | 2.20E+04 | | na |
| Methyl Bromide | AN | 5.21E+00 | | na | NA | 5.82E+04 | | na |
| Ethyl Chloride | NA | 2.32E+00 | | na | NA | 7.92E+06 | | na |
| Trichlorofluoromethane | NA | 7.30E+02 | | na | NA | 2.81E+06 | | na |
| 1,1-Dichloroethene | 4.28E-04 | 5.21E+02 | 8.22E-07 | ou | 4.78E-01 | 7.92E+04 | 6.04E-06 | 2 |
| Dichloromethane | 1.23E-02 | 4.09E+00 | 3.02E-03 | no | 3.22E+01 | 6.96E+05 | 4.62E-05 | 2 |
| 3-Chloropropene | NA | 1.04E+00 | | na | AN | 9.39E+03 | | na |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | NA | 3.13E+04 | | na | NA | 9.58E+06 | | БП |
| 1,1-Dichloroethane | NA | 5.21E+02 | | na | NA | 1.21E+06 | | na |
| cis-1,2-Dichloroethene | NA | 3.65E+01 | | na | NA | 7.92E+05 | | na |
| Trichloromethane | NA | 8.35E-02 | | na | NA | 9.76E+03 | | na |
| 1,2-Dichloroethane | NA | 7.39E-02 | | na | NA | 8.08E+03 | | na |
| 1,1,1-Trichloroethane | 2.85E-03 | 1.04E+03 | 2.73E-06 | no | 3.18E+00 | 1.94E+06 | 1.64E-06 | 2 |
| Benzene | 4.11E-03 | 2.49E-01 | 1.65E-02 | uo | 1.07E+01 | 1.56E+05 | 6.86E-05 | 2 |
| Carbon Tetrachloride | NA | 1.28E-01 | | na | NA | 1.28E+05 | | na |
| 1,2-Dichloropropane | NA | 9.89E-02 | | na | NA | 5.08E+05 | | na |
| Trichloroethene | NA | 1.12E+00 | | na | NA | 5.38E+05 | | na |
| cis-1,3-Dichloropropene | AA | 5.17E-02 | | na | » NA | 1.14E+04 | | na |
| trans-1,3-Dichloropropene | NA | 5.17E-02 | | na | ΝΑ | NA | | na |
| 1,1,2-Trichloroethane | NA | 1.20E-01 | | na | NA | 1.64E+05 | | na |
| Toluene | 6.25E-04 | 4.02E+02 | 1.56E-06 | no | 6.97E-01 | 1.88E+05 | 3.72E-06 | 2 |
| 1,2-Dibromoethane | NA | 8.73E-03 | | na | NA | 1.54E+05 | | na |
| Tetrachloroethene | NA | 3.31E+00 | | na | NA | 6.78E+05 | | na |
| Chlorobenzene | NA A | 6.21E+01 | | na | NA | 1.38E+05 | | na |
| Ethylbenzene | NA | 1.06E+03 | | na | AN | 5.43E+05 | | na |
| m&p-Xylene | NA | 7.30E+02 | | na | Ϋ́ | 6.51E+05 | | na |

Table D-56: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds 200 meter location

| | | 155mm pro | pelling cha D | rge M | arge M3A1 (zone 3), DODIC: D540 | 155mm propelling charge W3A1 (zone 3), M284 cannon DODIC: D540 | | |
|---------------------------|------------------|-----------------|------------------|-------|------------------------------------|---|----------|---------|
| | | Health-Based | | | | | | |
| Compound (a) | Cchronic (µg/m³) | Screening Level | · · | > 1? | Cacuta (ug/m³) | Acute l'oxicity | C. ATV | > 12 |
| | | (µg/m³) | HBSL | 1.5 | | Value (μg/m²) | | |
| Styrene | NA | 1.06E+03 | | na | ¥ | 2.13E+05 | | g |
| 1,1,2,2-Tetrachloroethane | NA | 3.31E-02 | | БП | ¥ | 2.06E+04 | | 5 E |
| o-Xylene | NA | 7.30E+02 | | na | NA | 6.51E+05 | | Б |
| 4-Ethyltoluene | AA | N | | na | NA | 1.25E+05 | | na |
| 1,3,5-Trimethylbenzene | AA A | 6.21E+00 | - | na | NA | 3.68E+05 | | na |
| 1,2,4-Trimethylbenzene | ΝΑ | 6.21E+00 | | na | NA | 1.80E+05 | | Ba |
| Benzyl Chloride | NA | 3.96E-02 | | na | ΑN | 5.20E+03 | | E |
| m-Dichlorobenzene | NA | 3.29E+00 | | na | ΑN | 3.61E+04 | | na |
| p-Dichlorobenzene | NA | 3.06E-01 | | na | ₹ | 6.61E+05 | | 2 |
| o-Dichlorobenzene | NA | 2.09E+02 | | na | ΑN | 3.01E+05 | | Eu |
| 1,2,4-Trichlorobenzene | NA | 2.08E+02 | | na | ΑN | 3.71E+04 | | ec |
| Hexachlorobutadiene | NA | 8.62E-02 | | Бa | ¥ | 3.21E+04 | | s c |
| Hydrocarbons | | | | | | | | 5 |
| Methane | 1.35E-01 | NV | | na | 6.01E+02 | 3.30E+06 | 1.82E-04 | 2 |
| Ethane | NA NA | N | | na | AN | ¥Z | | na |
| Ethylene | NA | NV | | na | ₹N | 4.60E+05 | | na |
| Propane | NA A | N | | na | ΑN | 3.78E+06 | | Ba |
| Acetylene | NA | N | | na | AA | ¥N | | ec |
| Isobutane | ٧N | N N | | na | AA | 9.52E+05 | | eu L |
| n-Butane | NA | N | | na | ΑN | 5.71E+06 | | E |
| Propylene | NA | N | | na | ΑN | ΑN | | na |
| Footnotes: | | | | | | | | |

NA = Not applicable

na = Not avaliable because health-based screening value is not avallable or not applicable because compound was not detected.

NV = No value

Cehronic = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

Sacute = Acute concentration

ATV = Acute toxicity value

1/16/01

Table D-57: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

> 1? na na 뗠 E E na na ā na 2 п na na g Ба E g ā E E na g g a a na g a na Cacute/ ATV 3.14E-05 1.89E-04 155mm propelling charge M3A1 (20ne 3), M284 cannon 1.50E+04 **Acute Toxicity** Value (µg/m³) 3.71E+04 7.86E+04 3.00E+04 3.21E+04 2.00E+04 5.53E+04 6.99E+04 3.00E+04 6.00E+02 6.61E+05 3.01E+05 2.00E+02 1.51E+04 2.83E+04 3.00E+04 2.00E+04 2,23E+02 3.85E+04 5.25E+03 3.61E+04 2.90E+04 ₹ ₹ ž ¥ Cacute (µg/m³) NA 2.47E+00 X X X X A A A A A Ν A A A A A Z Z Z Z Z Z ₹ DODIC: D540 × 12 na B na 2 2 5 E па na na па na ē na пa B g па g na na 8 na 2 na пa 1.77E-04 C_{chrontc}/ HBSL 7.45E-07 Screening Level Health-Based 1.10E+02 3.65E+04 3.65E+00 3.13E+00 1.46E+01 8.62E-02 4.80E-01 9.61E-04 1.83E+02 2.09E+00 1.10E+01 2.92E+02 1.10E+03 1.83E+02 2.08E+02 7.30E+01 7.30E-02 3.65E+02 7.08E+00 2.09E+02 7.30E+01 2.09E-01 2.19E+03 3.29E+00 (hg/m³) 1.37E-04 5.82E-03 1.83E+01 3.06E-01 1.92E-01 ⋛ Cehronic (µg/m³) 5.52E-04 ≨≱ **4444** A A A ₹Ž ₹ Ϋ́ ₹¥ ₹ ¥ ¥ Ž 200 meter location bis(2-chloroethoxy)methane hexachlorocyclopentadiene n-nitroso-di-n-propylamine bis(2-chloroisopropyl)ether 4-chloro-3-methylphenol 1,2,4-trichlorobenzene n-nitrosodimethylamine hexachlorobutadiene 2-methylnaphthalene 2,4,6-trichlorophenol bis(2-chloroethyl)ether 2,4,5-trichlorophenol 2-chloronaphthalene 1,3-dichlorobenzene 1,4-dichlorobenzene 1,2-dichlorobenzene 2,4-dimethylphenol dimethylphthalate 2,6-dinitrotoluene 2,4-dichlorophenol hexachloroethane 2-methylphenol 4-methylphenol 4-chloroaniline 2-nitroaniline 2-chlorophenol benzyl alcohol nitrobenzene naphthalene 2-nitrophenol Compound isophorone phenol

Table D-57: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds 200 meter location

| | | 156mm pr | obelling of | iarge M DODIC | 3A1 (Zone 3), : D540 | 155mm propelling charge M3A1 (26ne 3), M284 cannon b©DiC: D540 | | |
|----------------------------|------------------------------|--|--------------------------------|------------------|----------------------------|---|--------------------------|------|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | C _{scute} (µg/m³) | Acute Toxicity Value (µg/m³) | G _{acute} / ATV | > 12 |
| 3-nitroaniline | AN | N | | na | AN | 9.00E+03 | | Ē |
| 2,4-dinitrophenol | NA | 7.30E+00 | | na | NA | 7.50E+03 | | ВП |
| dlbenzofuran | NA | 1.46E+01 | | na | NA | NA | | na |
| 2,4-dinitrotoluene | NA | 7.30E+00 | | na | NA | 6.00E+02 | | na |
| 4-nitrophenol | NA | 2.92E+01 | | , na | NA | 3.00E+04 | | na |
| 4-chlorophenyl-phenylether | NA | NV | | na | NA | AN | | na |
| diethylphthalate | NA | 2.92E+03 | | na | NA | 1.50E+04 | | Вп |
| 4-nitroaniline | NA | NV | | na | NA | 9.00E+03 | | na |
| 4,6-dinitro-2-methylphenol | NA | 3.65E-01 | | na | NA | 5.00E+02 | | æ |
| n-nitrosodiphenylamine(1) | NA | 1.37E+00 | | na | NA | ΑN | | na |
| 4-bromophenyl-phenylether | NA | NV | | na | NA. | NA | | na |
| hexachlorobenzene | NA | 4.18E-03 | | na | NA | 7.50E+01 | | na |
| pentachlorophenol | NA | 5.60E-02 | | na | NA | 1.50E+03 | | na |
| di-n-butyiphthalate | 1.03E-03 | 3.65E+02 | 2.83E-06 | 20 | 4.61E+00 | 1.50E+04 | 3.07E-04 | 5 |
| butylbenzylphthalate | NA | 7.30E+02 | | na | NA | 5.00E+05 | | na |
| bis(2-ethylhexyl)phthalate | NA | 4.80E-01 | | na | NA | 1.00E+04 | | na |
| di-n-octylphthalate | NA | 7.30E+01 | | na | NA | 1.50E+05 | | na |
| Footnotes: | | | | | | | | |
| NA - Not populicable | | | | | | | | |

NA = Not applicable

na = Not available because health-based screening value is not available or not applicable because compound was not detected.

NV = No value Cenronic = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

Cacute = Acute concentration

ATV = Acute toxicity value

Table D-58: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aidehydes, and Acid Gases

| ZOO MACALOCARON | | 1.K5mm | negue | .harna A | (244 (76ne 3) | 155mm neabelling charge 163.04 (20ne 3), 10282 cannon | | |
|-------------------------------------|------------------------------|--|--------------------------------|----------|----------------------------|---|--------------------------|------|
| | | | | DODIC | DÓDIC: DS40 | | | |
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | С _{асиtе} (µg/m³) | Acute Toxicity Value (μg/m³) | G _{acute} / ATV | > 1? |
| PAHs | | | | | | | | |
| acenaphthylene | 9.18E-05 | NV | | na | 4.10E-01 | 2.00E+02 | 2.05E-03 | no |
| acenaphthene | NA | 2.19E+02 | | na | NA | 1.25E+03 | | na |
| fluorene | 3.77E-06 | 1.46E+02 | 2.58E-08 | no | 1.68E-02 | 7,50E+04 | 2.24E-07 | no |
| phenanthrene | 2.78E-05 | NV | | na | 1.24E-01 | 2.00E+03 | 6.21E-05 | no |
| anthracene | 7.88E-06 | 1.10E+03 | 7.20E-09 | , no | 3.52E-02 | 6.00E+03 | 5.87E-06 | no |
| fluoranthene | 2.72E-05 | 1.46E+02 | 1.86E-07 | no | 1.22E-01 | 3.00E+01 | 4.05E-03 | no |
| pyrene | 5.42E-05 | 1.10E+02 | 4.95E-07 | no | 2.42E-01 | 1.50E+04 | 1.61E-05 | ũ |
| benzo(a)anthracene | 2.07E-06 | 2.17E-02 | 9.54E-05 | no | 2.16E-02 | 6.00E+02 | 3.60E-05 | OL |
| chrysene | 2.07E-06 | 2.17E+00 | 9.54E-07 | no | 2.16E-02 | 2.00E+02 | 1.08E-04 | no |
| benzo(b)fluoranthene | 5.40E-06 | 2.17E-02 | 2.49E-04 | no | 1.41E-02 | ۷N | | na |
| benzo(k)fluoranthene | 3.57E-06 | 2.17E-01 | 1.64E-05 | no | 9.29E-03 | ۷V | | na |
| benzo(a)pyrene | 8.20E-06 | 2.17E-03 | 3.78E-03 | no | 8.54E-02 | 7.50E+03 | 1.14E-05 | no |
| indeno(1,2,3-cd)pyrene | 1.13E-05 | 2.17E-02 | 5.21E-04 | no | 2.94E-02 | AN | | na |
| dibenz(a,h)anthracene | 3.87E-07 | 2.17E-03 | 1.79E-04 | on O | 4.04E-03 | 3.00E+04 | 1.35E-07 | no |
| benzo(g,h,l)perylene | 4.67E-05 | N | | na | 2.08E-01 | 3.00E+04 | 6.95E-08 | no |
| Dioxins / Furans | | | | | | | | |
| 2378-Tetrachlorodibenzo-p-dloxin | NA | 4.48E-08 | | na | NA A | 3.50E+00 | | na |
| 12378-Pentachlorodibenzo-p-dioxin | NA | N | | na | NA | 2.50E+00 | | na |
| 123478-Hexachlorodibenzo-p-dloxin | NA | NV | | na | NA | AN | | na |
| 123678-Hexachlorodibenzo-p-dloxin | 1.32E-10 | N | | na | 5.90E-07 | 1.50E+01 | 3.93∈-08 | ou . |
| 123789-Hexachlorodibenzo-p-dloxin | 6.43E-11 | 1.48E-06 | 4.35E-05 | 20 | 1.68E-07 | NA | | na |
| 1234678-Heptachlorodibenzo-p-dloxin | 1.57E-09 | N | | na | 1.75E-06 | NA | | na |
| Octachlorodibenzo-p-dioxin | 7.55E-09 | N | | na | 8.43E-06 | AA | | na |
| 2378-Tetrachlorodibenzo-p-furan | NA | N | | na | NA | 2.00E+00 | | na |
| 12378-Pentachlorodibenzo-p-furan | AN. | N | | na | NA | NA | | na |
| 23478-Pentachlorodibenzo-o-furan | AA | N | | na | NA | 7.50E-02 | | na |
| 123478-Hexachlorodibenzo-p-furan | NA | N | | na | NA NA | 7.50E+00 | | na |
| 123789-Hexachlorodibenzo-p-furan | NA | NV | | na | NA A | NA NA | | na |
| 234678-Hexachiorodibenzo-p-furan | NA | N | | na | ΑN | 1.50E+00 | | na |
| 1234678-Heptachlorodibenzo-p-furan | 1.11E-10 | N | | na | 1.24E-07 | NA | | na |
| 1234789-Heptachlorodibenzo-p-furan | - NA | NV | | na | NA | AN | | na |
| OCDF | 2.33E-10 | N | | na | 2.60E-07 | AA | | na |
| Aldehydes | | | | | | | | |
| Formatdehyde | AN | 1.48E-01 | | na | NA | 1.23E+03 | | na |
| | | | | | | | | |

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Table D-58: Comparison of Air Concentrations With Health-Based Values: PAHs, Dioxins/Furans, Aidehydes, and Acid Gases 200 meter location

| | | 155mm | propalling | Sharge (| arge M3A1 (zone 3); DODIC: D540 | 155mm propelling charge M3A1 (zone 3); M284 cannon DODIC: D540 | | , San J. C. |
|--------------------------|------------------------------|--|--------------------------------|----------|------------------------------------|---|-------------|---|
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | G _{chronic} / HBSL | > 12 | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 12 |
| Acetaldehyde | AA A | 8.73E-01 | | na | AN | 1.80E+04 | | na |
| Acetone | NA | 3.65E+02 | | na | NA | 2.37E+06 | | na |
| Acrolein | NA | 2.09E-02 | | na | NA | 2.30E+02 | | na |
| Proprionaldehyde | NA | N N | | na | NA | 7.50E+04 | | na |
| Crotonaldehyde | AN | 3.54E-03 | | na | NA · | 5.72E+03 | | na |
| Butyraldehyde | ΝA | N/ | | , na | NA | 7.38E+04 | | na |
| Benzaldehyde | NA | 3.65E+02 | | na | NA | 1.50E+04 | | na |
| Isovaleraldehyde | NA | N | | na | NA | NA | | na |
| Valeraldehyde | NA | N | | na | NA | NA | | na |
| o,m,p-Tolualdehyde | NA | N | | na | NA | NA | | na |
| Hexaldehyde | AN | N/ | | eu | AN | WA | | na |
| 2,5-Dimethylbenzaldehyde | NA | N | | eu | ۷V | AN | | na |
| Acid Gases | | • | | | | | | |
| Hydrogen fluoride | AN | NV | | eu | AN | 1.60E+03 | | na |
| Hydrogen chloride | NA | 2.08E+01 | | na | NA | 4.50E+03 | | na |
| Hydrogen bromide | NA | NV | | eu | NA | 9.93E+03 | | na |
| Nitric Acid | 3.51E-03 | N/ | ٠ | na | 3.92E+00 | 5.16E+03 | 7.60E-04 | uo |
| Phosphoric acid | NA | 1.04E+01 | | na | NA | 3.00E+03 | | na |
| Sulfuric Acid | 5.18E-02 | NV | | na | 5.78E+01 | 2.00E+03 | 2.89E-02 | 01 |
| ** - dede | | | | | | | | |

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

Cehronic = Chronic time-averaged concentration; HBSL = Chronic health-based screening level

Cacute = Acute concentration; ATV = Acute toxicity value

Table D-59: Comparison of Air Concentrations With Health-Based Values: Cyanides and Energetics 200 meter location

| ZOO METER TOCATION | | A STATE OF THE STA | | | | | | - | |
|---|------------------------------|--|--------------------------------|------|----------------------------|---|-------------|------|--|
| | | 1001111 | | | 1540 1. D540 | toonin propering charge model (zone 3), mz64 cannon DODIC: D540 | | | |
| Compound | C _{chronic} (µg/m³) | Health-Based Screening Level (µg/m³) | C _{chronic} / HBSL | > 1? | C _{acute} (µg/m³) | Acute Toxicity Value (µg/m³) | Cacute/ ATV | > 1? | |
| Particulate Cyanide and Hydrogen Cyanide (CN) | | | | | | | | | |
| Particulate Cyanide | AN | 7.30E+01 | | na | ΑN | 5.00E+03 | | na | |
| Hydrogen Cyanide | 1.58E-01 | 3.13E+00 | 5.05E-02 | no | 7.06E+02 | 5.17E+03 | 1.37E-01 | п | |
| Energetics | | | | | | | | | |
| Nitrobenzene | ΝA | 2.09E+00 | • | na | NA | 1.51E+04 | | na | |
| 2-Nitrotoluene | AN | 3.65E+01 | | na | NA | NA | | na | |
| 3-Nitrotoluene | ΝA | 3.65E+01 | | na | NA | NA | | na | |
| 4-Nitrotoluene | NA | 3.65E+01 | | na | NA | 3.37E+04 | | na | |
| Nitroglycerine | NA | 4.80E-01 | | na | NA | NA | | na | |
| 1,3-Dinitrobenzene | AN | 3.65E-01 | | na | NA | 3.00E+03 | | na | |
| 2,6-Dinitrotoluene | NA | 3.65E+00 | | na | NA | 6.00E+02 | | na | |
| 2,4-Dinitrotoluene | NA | 7.30E+00 | | na | NA | 6,00E+02 | | na | |
| 1,3,5-Trinitrobenzene | NA | 1.10E+02 | | na | NA | 3.00E+04 | | na | |
| 2,4,6-Trinitrotoluene | NA | 2.24E-01 | | na | NA | 2.50E+04 | | na | |
| RDX | NA | 6.11E-02 | | na | NA | NA | | na | |
| 4-Amino-2,6-Dinitrotoluene | NA | N | | | NA | NA | | | |
| 2-Amino-4,8-Dinitrotoluene | NA | N. | | | NA | 1.50E+04 | | | |
| Tetryl | NA | 3.65E+01 | | na | NA | NA | | na | |
| HMX | NA | 1.83E+02 | | na | NA | NA | | na | |
| Pentaerythritoltetranitrate | NA | N | | na | NA | 5.00E+01 | | na | |
| Dibutyl phthalate | NA | 3.65E+02 | | na | NA | 1.50E+04 | | na | |
| Dioctyl phthalate | Ν | 4.80E-01 | | na | NA | 1.00E+04 | | na | |
| Diphenylamine | NA | 9.13E+01 | | na | NA | 3.00E+04 | | na | |
| | | | | | | | | · | |

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

C_{chronic} = Chronic time-averaged concentration; HBSL = Chronic health-based screening level C_{acute} = Acute concentration; ATV = Actite toxicity value

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M3risk1.xls

1/16/01

Table D-60: Comparison of Air Concentrations With Health-Based Values: Total Petroleum Hydrocarbons 200 meter location

| | 185տա թ | 185mm propelling charge M3A1 (zone 3), M284 cannon BODIC: D540 | arge M3A1 (zone 3), M28 DODIC: D540 | 84 cannon |
|--------------------------------------|------------------------------|---|--|------------------|
| Compound (a) | C _{chronic} (µg/m³) | C _{chronic} (µg/m³) | Cehronic (µg/m³) | Cehronic (µg/m³) |
| | Allphatic:C<=8 | Allphatic:C>8 | Aromatic:.C<=8 | Aromatic: C>8 |
| Benzene | NA | NA | 9.59E-03 | NA |
| Toluene | NA | NA | 6.25E-04 | NA |
| naphthalene | NA | - NA | NA | 5.52E-04 |
| acenaphthylene | N A | AN | NA | 9.18E-05 |
| acenaphthene | NA | ΑN | NA | |
| fluorene | NA | ΑΝ | NA | 3.77E-06 |
| phenanthrene | NA | NA | NA | 2.78E-05 |
| anthracene | NA | NA | NA | 7.88E-06 |
| Total (µg/m³) | 0.00E+00 | 0.00E+00 | 1.02E-02 | 6.84E-04 |
| Derived Health-Based Screening Level | 1.92E+04 | 1.04E+03 | 4.17E+02 | 2.09E+02 |
| C _{chronic} /HBSL | 0.00E+00 | 0.00E+00 | 2.45E-05 | 3.28E-06 |
| >12 | no | ou | no | no |
| | | | | |

>1? = Is the ratio greater than one?

NA = Not Applicable because compound was not detected

C_{chronlc} = chronic averaged air Concentration (not adjusted for cancer averaging time of 70 years)

HBSL = Health-Based Screening Level

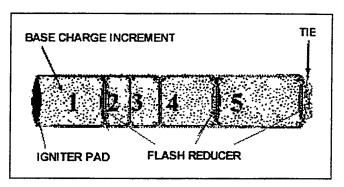
APPENDIX E

FACT SHEET SUBMITTED TO THE U.S. ARMY ENVIRONMENTAL CENTER

U.S. Army Environmental CenterTraining Munitions Fact Sheet

155-mm Propelling Charge (M3 Series)
Department of Defense Identification Code: D540

Breathing air emissions from the 155-mm propelling charge will not impact the health of residents who live as close as 200 meters (656 feet) from the firing location.



To be fully prepared to protect our country, U.S. soldiers must train with many different weapons and munitions, including the 155-mm propelling charge. This training is important because it helps prepare our soldiers for a variety of combat situations. While the Army recognizes the value of such comprehensive training on our installations, we also work hard to ensure the safety and health of surrounding communities.

WILL BREATHING AIR EMISSIONS FROM THE 155-MM PROPELLING CHARGE AFFECT MY HEALTH?

To answer this question, the U.S. Army tested the air emissions that are released when the 155-mm propelling charge is used. The information gathered during these tests was then analyzed to determine if there would be a potential for health effects from inhalation to residents who live near training areas. Study results, generated using conservative methods, showed that offsite residents breathing air as close as 200 meters (656 feet or about the length of two football fields) from the firing location are safe from these emissions. If offsite residents are located less than 200 meters from the firing locations, a more site-specific evaluation would be necessary. It should be noted that at most locations, training areas are at least 1,000 meters (over half a mile) away from populated areas and the distance to firing locations may be even farther.

How Was The Study Conducted?

To gather data for this study, the M3 series charges were used with two different kinds of howitzer cannons in a test chamber. The air in the chamber was then tested to identify the types and amounts of substances released. About 300 different substances were looked for during this part of the study.

This information was then used in an U.S. Environmental Protection Agency (USEPA) approved air model (a computer program that allows estimation of air concentrations) to determine the amount of each substance to which someone living near a training site might be exposed. Downwind concentrations were estimated based on a typical use scenario for the 155-mm propelling charge during training exercises. Since this study did not look at any one specific training area, the assumptions used in the model would, in most cases, predict higher downwind air concentrations than those expected at an actual training site.

These estimated air concentrations were then compared to screening levels established by the USEPA and other federal agencies. If the air concentrations are less than these screening levels, they are considered safe for the general population, including sensitive people such as the sick, elderly, and children.

WHAT ARE THE STUDY LIMITATIONS?

Many steps were taken to ensure that the results of this study are protective of residents who live near training facilities. However, as with any study, this study has limitations. For example, the study does not consider exposure to other types of munitions that could also be used during the same training event. Due to these limitations, conservative model conditions were used to ensure the protection of public health from breathing air emissions from the 155-mm propelling charge.

WHAT EXACTLY IS THE 155-MM PROPELLING CHARGE?

Propelling charges are a type of explosive that provides the thrust needed to send projectiles into the air. The 155-mm propelling charge is used for firing projectiles from 155-mm howitzers (a kind of cannon). This charge can be classified into two types: M3A1 and M3, or simply, the M3 series. They are also commonly called "green bags". The 155-mm propelling charge consists of five bags of different charge. Each bag is also called an increment. The bags are fastened together with cloth straps sewn to the base of each increment and tied on the top of the fifth increment. Up to five charges can be loaded into the howitzer before a projectile can be fired. The actual number of charges fired with the projectile will depend on the distance to the target and other tactical factors. The M3 and M3A1 charges have a slightly different composition. Charge M3A1 has flash reducer pads that contain either potassium nitrate or potassium sulfate. Both types have an igniter charge which is made up of mostly nitrocellulose or black powder. Nitrocellulose and black powder are commonly used in consumer fireworks.

WHERE CAN I GET MORE INFORMATION?

For more information on the 155-mm propelling charge or other military munitions, please call the Army Environmental Hotline at 1-800-USA-3845, visit our Web site at www.aec.army.mil, or e-mail thotline@aec.apgea.army.mil.

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